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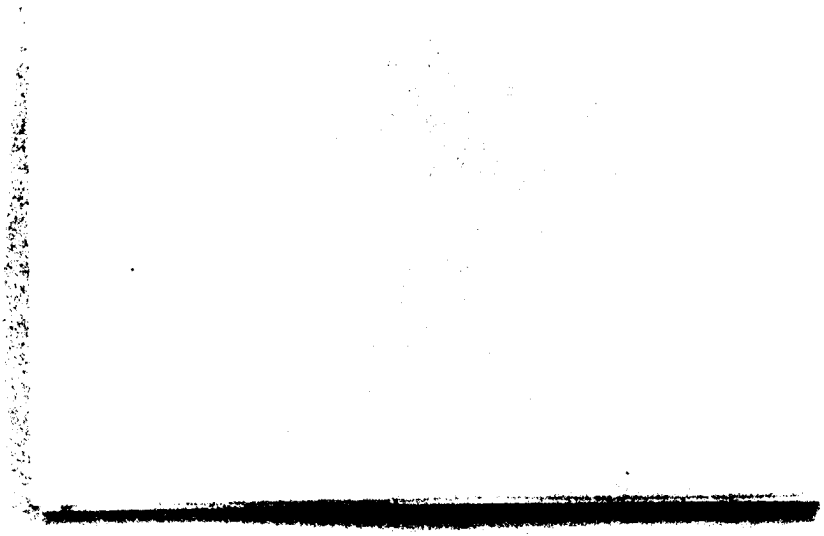
ULTRASHORT-WAVE RADIO STATION

Type УКВ

ALBUM OF DRAWINGS AND DIAGRAMS



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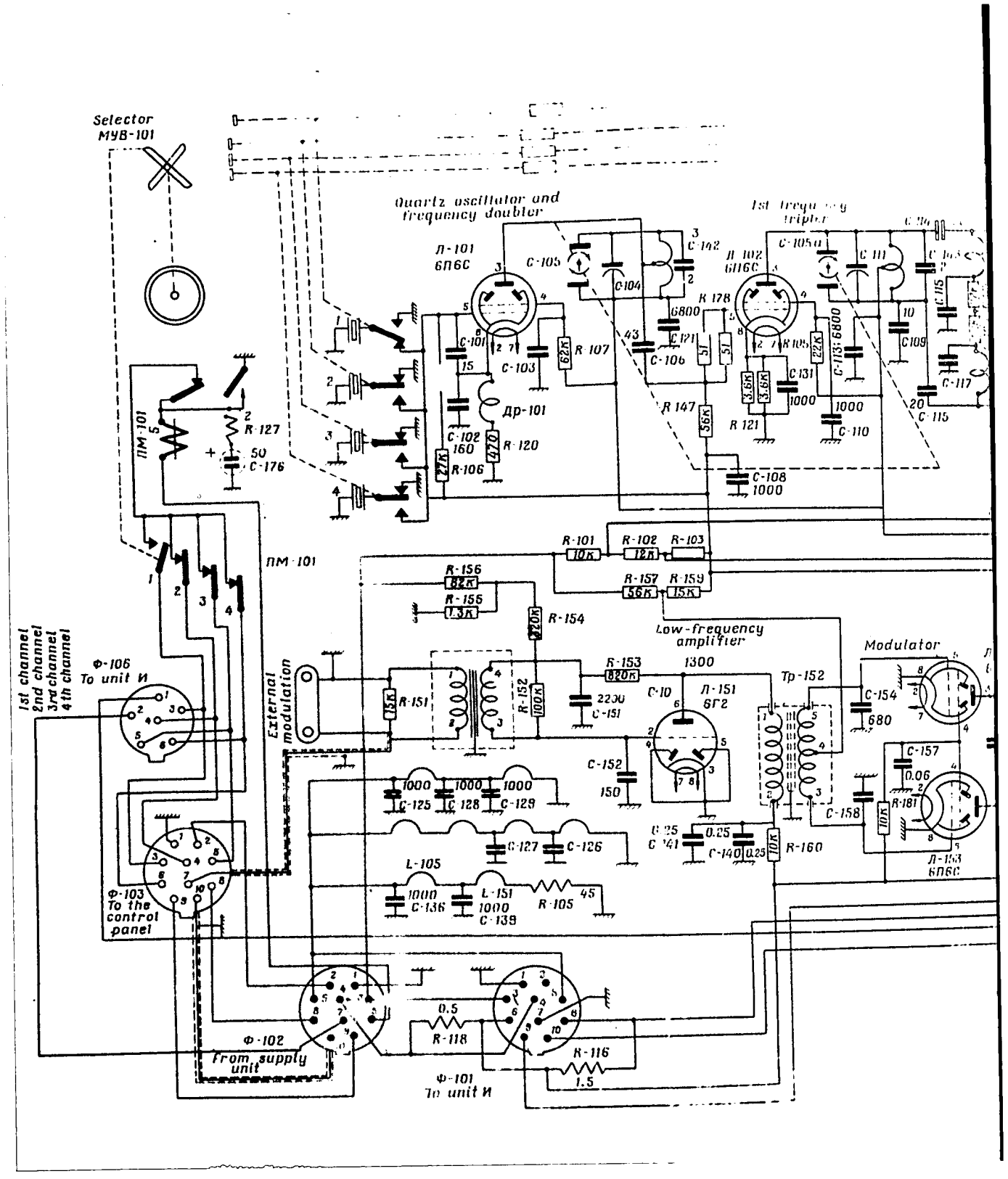

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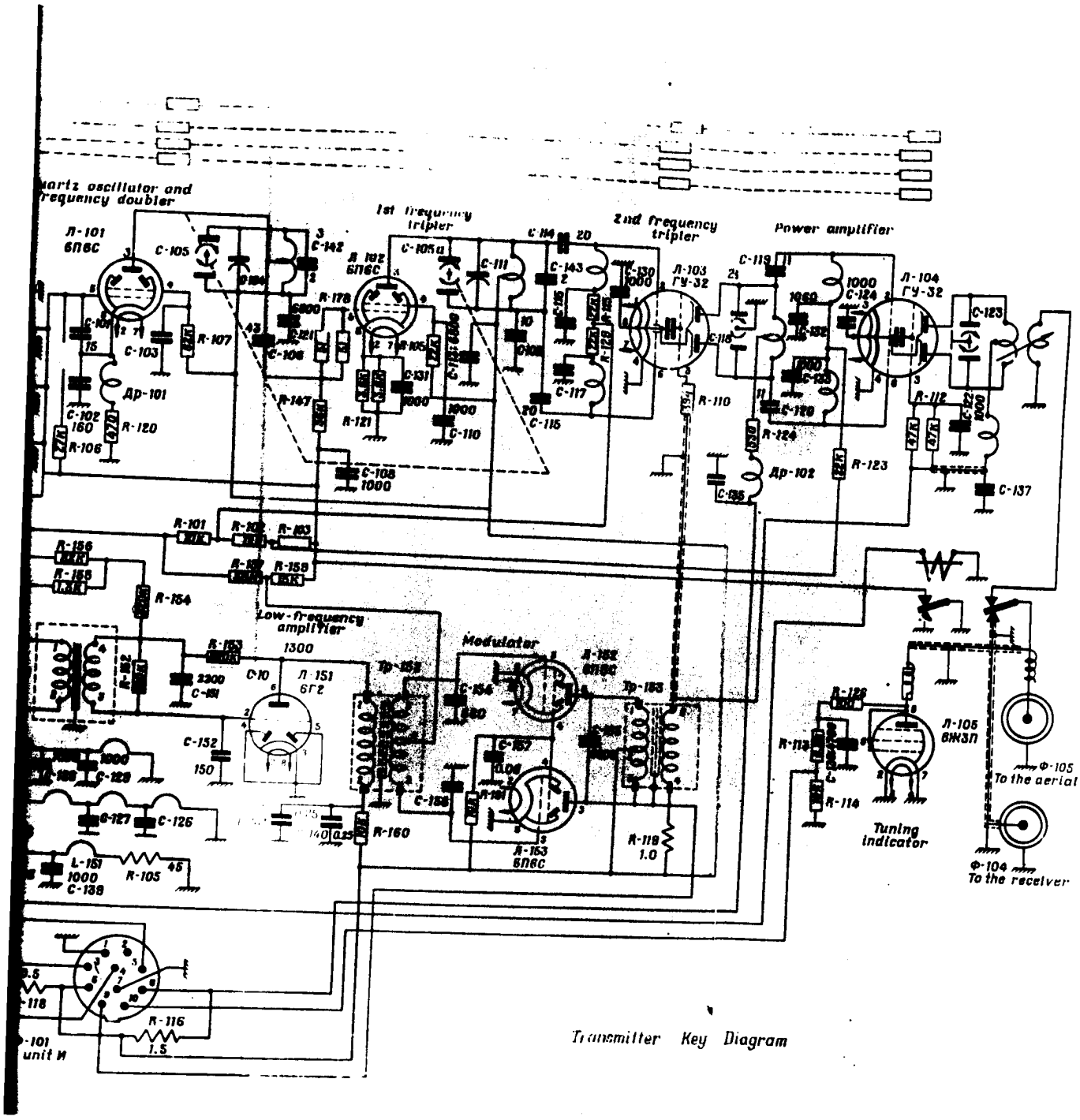

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LIST OF PARTS TO THE TRANSMITTER KEY DIAGRAM

Ref. Nos	Name	Designation	Quantity	Note
1	2	3	4	5
		Radio-frequency Part of the Transmitter		
		Condensers		
C-101	C=15pF ± 10%	КТК-1м-15-II	1	
C-102	C=150pF ± 5%	КТК-3м-150-1	1	
C-103	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-104	Trimming		1	
C-105a	Variable	C=8-45 pF	1	
C-105	Variable	C=8-45 pF	1	
C-106	C=43 pF ±10%	КДК-2-Д-43-II	1	
C-108	C=1000pF ±20%	КСО-2-500-Б-1000-III	1	
C-109	C=10pF ± 10%	КТК-1-Д-10-II	1	
C-110	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-111	Trimming		1	
C-113	C=6800pF ± 20%	КСО-5-500-Б-6800-III	1	
C-114	C= 20 pF ± 10%	КДК-2-Д-20-II	1	

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1	2	3	4	5
C-115	C=20pF ± 10%	КДК-2-Д-20-II	1	
C-116	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-117	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-118	Variable	C=4-20 pF	1	
C-119	C=11pF ± 10%	КДК-2-Д-11-II	1	
C-120	C=11pF ± 10%	КДК-2-Д-11-II	1	
C-121	C=6800pF ± 10%	КСО-5-500-Б-6800-II	1	
C-122	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-123	Adjustable	C=2-3-16pF	1	
C-124	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-125	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-126	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-127	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-128	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-129	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-130	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-131	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-132	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-133	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-135	C=6800pF ± 20%	КСО-5-500-Б-6800-III	1	
C-136	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-137	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-138	C=4700pF ± 20%	КСО-5-500-Б-4700-III	1	

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1	2	3	4	5
C-139	C=1000pF ± 20%	КСО-2-500-Б-1000-III	1	
C-140	C=0.25 μF ± 10%	КБГ-$М_1$-400-0.25-II	1	
C-141	C=0.25 μF ± 10%	КБГ-$М_1$-400-0.25-II	1	
C-142 x)	C=2pF ± 10%	КДК-1-М-2-II	1	
C-143	C=2pF ± 10%	КДК-1-М-2	1	
	Resistors			
R-101	R-10 KΩ ± 10%	ВС-1А-10 KΩ ± 10%	1	
R-102	R-12 KΩ ± 10%	ВС-1А-12 KΩ ± 10%	1	
R-104 x)	R-18 KΩ ± 10%	ВС-1А-18 KΩ ± 10%	1	To be adjusted from 18 to 30 kilohms
R-105	R-43 Ω	Wire-wound resistor 1-43Ω	1	
R-106	R-27 KΩ ± 10%	ВС-0.25А-27 KΩ ± 10%	1	
R-107	R-62 KΩ ± 10%	ВС-1А-62 KΩ ± 10%	1	
R-108	R-51 Ω ± 10%	ВС-0.25А-51 ohm ± 10%	2	In parallel
R-109	R-22 KΩ ± 10%	ВС-1А-22 KΩ ± 10%	1	
R-110 x)	R-39 KΩ ± 10%	ВС-1А-39 KΩ ± 10%	1	To be adjusted from 30 to 47 kilohms
R-112 x)	R-47 KΩ ± 10%	ВС-1А-47 KΩ ± 10%	2	To be adjusted from 27 to 47 kilohms each

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1	2	3	4	5
R-113	R-6.8 KΩ ± 10%	BC-0.25A-6.8 KΩ ±10%	1	
R-114	R-10 KΩ ± 10%	BC-0.25A-10 KΩ ± 10%	1	
R-116	R-1.5Ω	Wire-wound	1	
R-117	R-56 KΩ ± 10%	BC-0.25A-56 KΩ ± 10%	1	
R-118	R-0.5 Ω	Wire-wound	1	
R-119	R-1.0 Ω	Wire-wound	1	
R-120	R-470Ω ± 10%	BC-2A-470Ω ± 10%	1	
R-121	R-3.6 KΩ ± 10%	BC-2A-3.6 KΩ ± 10%	2	
R-123	R-22 KΩ ± 10%	BC-0.25A-22 KΩ ± 10%	1	
R-124	R-330Ω ± 10%	BC-2A-330Ω ± 10%	1	
R-126	R-100Ω ± 10%	BC-0.25A-100Ω ± 10%	1	
R-128	R-22 KΩ ± 10%	BC-1A-22 KΩ ± 10%	1	
R-129	R-22 KΩ ± 10%	BC-1A-22 KΩ ± 10%	1	
	Valves			
Л-101	6П6С		1	
Л-102	6П6С		1	
Л-103	ГУ-32		1	
Л-104	ГУ-32		1	
Л-105	6Ж3П		1	
	Coils			
L-101	Doubler		1	
L-102	1st tripler		1	
L-103	2nd tripler		1	

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1	2	3	4	5
L-104	Power amplifier		1	
L-105	Aerial coupling		1	
L-106	Aerial coupling		1	
L-107	Radio-frequency choke		1	
	Chokes			
Др-101	L-700 μH		1	
Др-102	L-2.2 μH		1	
Др-103	L-2.2 μH		1	
Др-104	L-2.2 μH		1	
Др-105	L-2.2 μH		1	
Др-106	L-2.2 μH		1	
Др-107	L-2.2 μH		1	
Др-108	L-700 μH		1	
	Modulator			
	Condensers			
C-151	C-2,200 pF ± 10%	КСО-5-500-Б-2,200-II	1	
C-152	C-150 pF ± 10%	КСО-1-250-Б-150-II	1	
C-153	C-1,300 pF ± 10%	КСО-5-500-Б-1,300-II	1	
C-154	C-680 pF ± 10%	КСО-2-500-Б-680-II	1	
C-155	C-6,800 pF ± 10%	КСО-5-500-Б-6,800-II	1	
C-156	C-680 pF ± 10%	КСО-2-500-680-II	1	
C-157	C-0.05 μF ± 10%	КБГ-$М_1$-600-0.05-II	1	

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1	2	3	4	5
	Resistors			
R-151	R-15 Kᴧ ± 10%	BC-0,25A-15 Kᴧ ± 10%	1	
R-152	R-100 Kᴧ ± 10%	BC-0,25A-100 Kᴧ± 10%	1	
R-153	R-820 Kᴧ ± 10%	BC-0.25A-820 Kᴧ± 10%	1	
R-154	R-820 Kᴧ ± 10%	BC-0,25A-820 Kᴧ± 10%	1	
R-155	R-1.5 Kᴧ ± 10%	BC-0,25A-1.5 Kᴧ± 10%	1	
R-156	R-82 Kᴧ ± 10%	BC-0,25A-82 Kᴧ± 10%	1	
R-157	R-56 Kᴧ ± 10%	BC-0.25A-56 Kᴧ± 10%	1	
R-159	R-15 Kᴧ ± 10%	BC-0.25A-15 Kᴧ± 10%	1	
R-160	R-10 Kᴧ ± 10%	BC-0.5A-10 Kᴧ ± 10%	1	
R-161	R-10 Kᴧ ± 10%	BC-1A-10 Kᴧ± 10%	1	
	Valves			
Л-151	6Г2		1	
Л-152	6П6С		1	
Л-153	6П6С		1	
	Transformers			
Тр-151	Modulator input		1	
Тр-152	Interstage		1	
Тр-153	Modulation		1	
	Automatic Control Equipment			
ДМ-101	Selector motor		1	
П-101	Quartz crystal switch		1	

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1	2	3	4	5
MVB-101	Wave changing mechanism		1	
P-101	Aerial relay		1	
K-101	Reset button		1	
R-127	Resistor R=2 Ω ± 10%		1	
C-170	Condenser C=50 μF ± 10%		1	
	Cable Connectors			
Φ-101	For 10 jacks		1	
Φ-102	For 10 pins		1	
Φ-103	For 10 jacks		1	
Φ-104	Aerial		1	
Φ-105	Aerial		1	
Φ-106	For 6 jacks		1	

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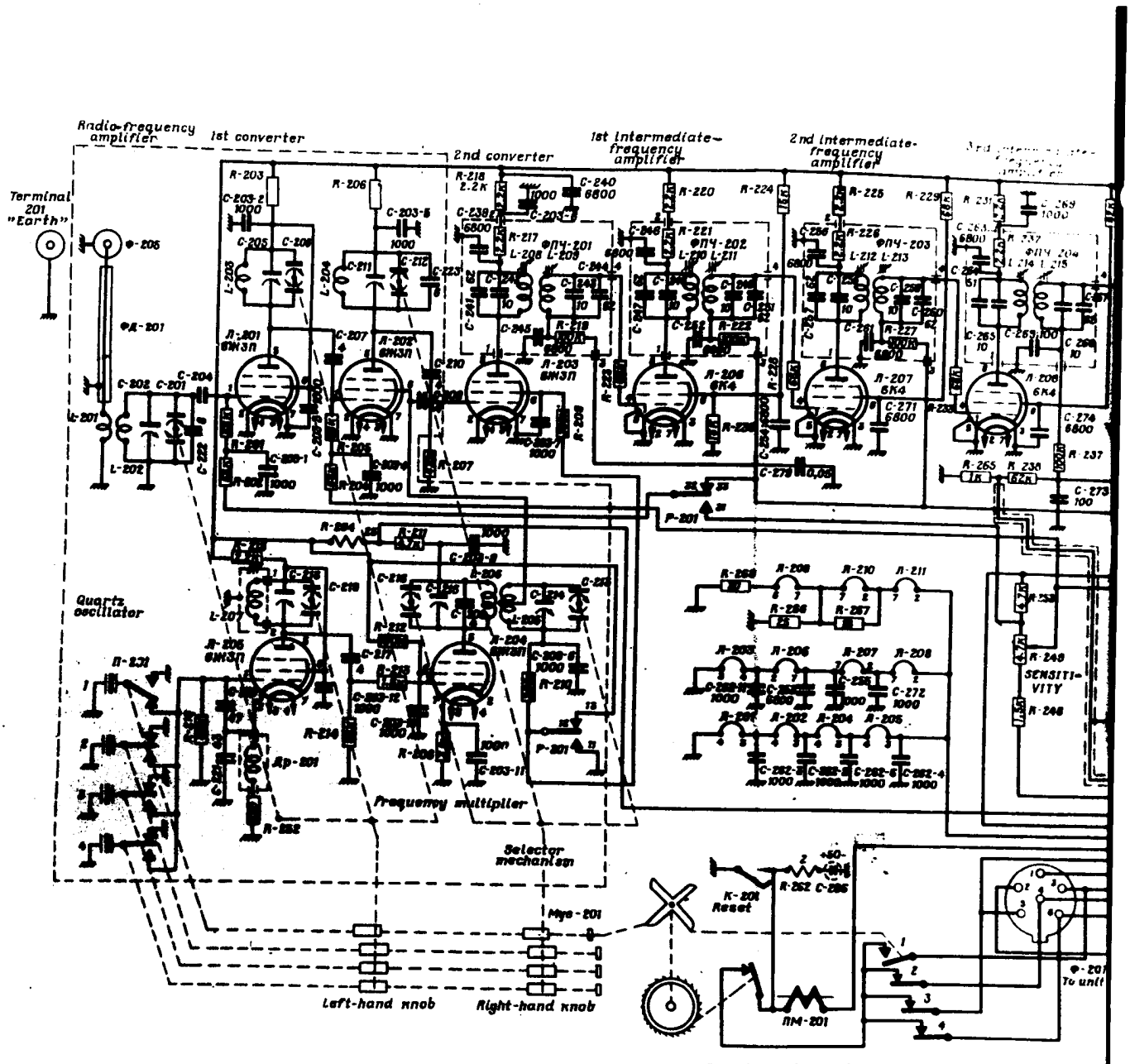

Receiver Key Diagram

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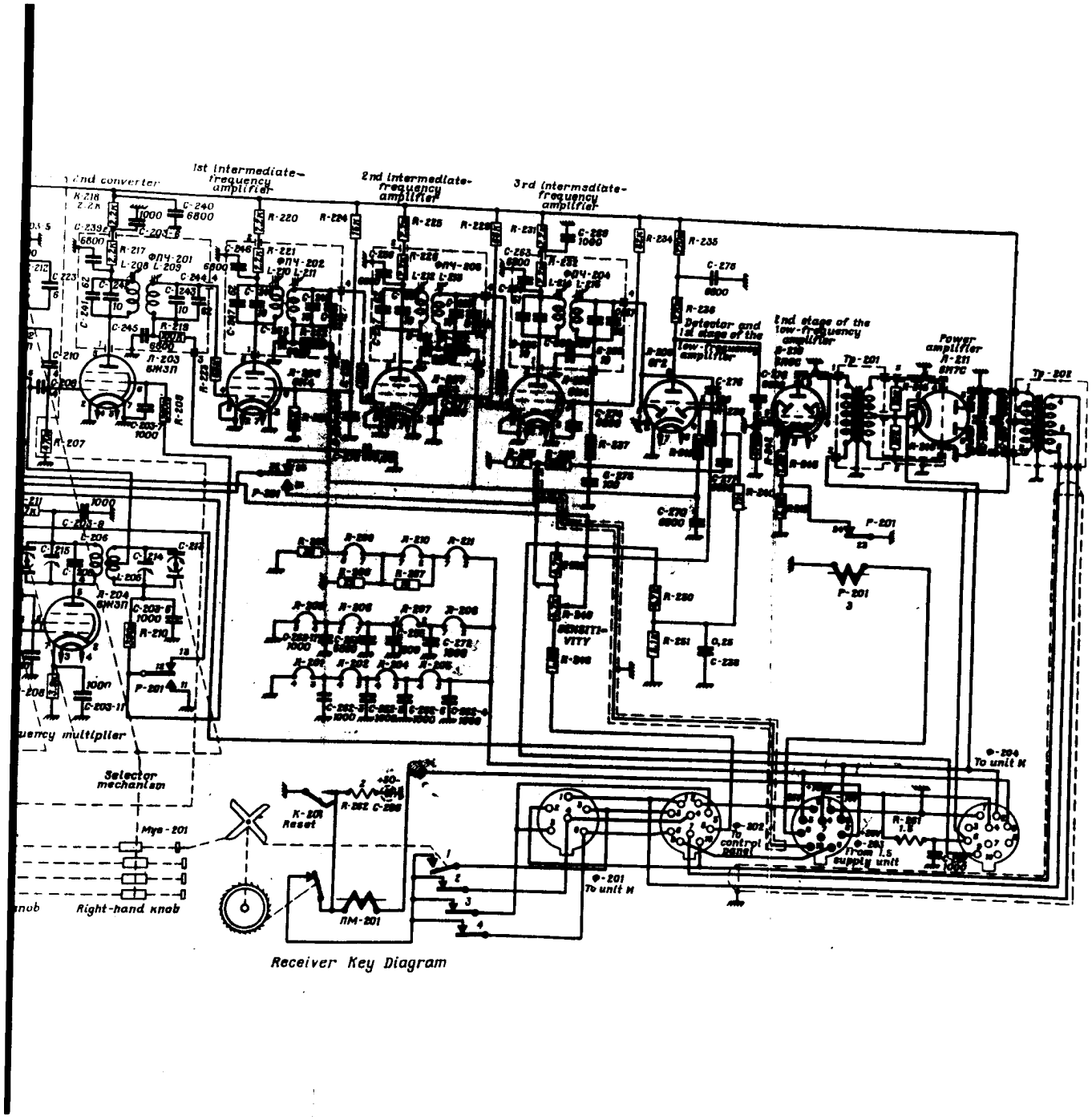

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SCHEDULE OF PARTS TO THE RECEIVER KEY DIAGRAM

9

Ref. Nos	Name	Designation	Quantity	Note
1	2	3	4	5
	Resistors			
R-201	R=68 KΩ ± 20%	BC-0.25A-68 KΩ ± 20%	1	
R-202	R=68 KΩ ± 20%	BC-0.25A-68 KΩ ± 20%	1	
R-203	R=68 KΩ ± 10%	BC-0.25A-68 KΩ ± 10%	1	
R-204	R=68 KΩ ± 20%	BC-0.25A-68 KΩ ± 20%	1	
R-205	R=68 KΩ ± 20%	BC-0.25A-68 KΩ ± 20%	1	
R-206	R=4.7 KΩ ± 10%	BC-0.5A-4.7 KΩ ± 10%	1	
R-207	R=470 KΩ ± 20%	BC-0.25A-470 KΩ ± 20%	1	
R-208	R=3.9 KΩ ± 10%	BC-0.25A-3.9 KΩ ± 10%	1	
R-209	R=390 KΩ ± 10%	BC-0.25A-390 KΩ ± 10%	1	
R-210	R=390 KΩ ± 10%	BC-0.25A-390 KΩ ± 10%	1	
R-211	R=4.7 KΩ ± 10%	BC-0.25A-4.7 KΩ ± 10%	1	
R-212	R=100 KΩ ± 10%	BC-0.25A-100 KΩ ± 10%	1	
R-213	R=1.5 KΩ ± 10%	BC-0.25A-1.5 KΩ ± 10%	1	
R-214	R=68 KΩ ± 10%	BC-0.25A-68 KΩ ± 20%	1	
R-215	R=2.2 KΩ ± 10%	BC-0.5A-2.2 KΩ ± 10%	1	
R-216	R=68 KΩ ± 20%	BC-0.25A-68 KΩ ± 20%	1	

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1	2	3	4	5
R-217	R=2.2 KΩ ± 10%	BC-1A-2.2 KΩ ± 10%	1	
R-218	R=2.2 KΩ ± 10%	BC-0.25A-2.2 KΩ ± 10%	1	
R-219	R=100 KΩ ± 10%	BC-0.25A-100 KΩ ± 10%	1	
R-220	R=2.2 KΩ ± 10%	BC-0.25A-2.2 KΩ ± 10%	1	
R-221	R=2.2 KΩ ± 10%	BC-1A-2.2 KΩ ± 10%	1	
R-222	R=100 KΩ ± 10%	BC-0.25A-100 KΩ ± 10%	1	
R-223	R=68 Ω ± 10%	BC-0.25A-68Ω ± 10%	1	
R-224	R=15 KΩ ± 10%	BC-0.5A-15 KΩ ± 10%	1	To be adjusted from 15 to 47 kilohms
R-225	R=2.2 KΩ ± 10%	BC-0.25A-2.2 KΩ ± 10%	1	
R-226	R=2.2 KΩ ± 10%	BC-1A-2.2 KΩ ± 10%	1	
R-227	R=100 KΩ ± 10%	BC-0.25A-100 KΩ ± 10%	1	
R-228	R=68Ω ± 10%	BC-0.25A-68Ω ± 10%	1	
R-229	R=68 KΩ ± 10%	BC-0.25A-68 KΩ ± 10%	1	
R-230	R=15 KΩ ± 10%	BC-0.5A-15 KΩ ± 10%	1	
R-231	R=2.2 KΩ ± 10%	BC-0.25A-2.2 KΩ ± 10%	1	
R-232	R=2.2 KΩ ± 10%	BC-1A-2.2 KΩ ± 10%	1	
R-233	R=68Ω ± 10%	BC-0.25A-68Ω ± 10%	1	
R-234	R=82 KΩ ± 10%	BC-0.25A-82 KΩ ± 10%	1	
R-235	R=220 KΩ ± 10%	BC-0.25A-220 KΩ ± 10%	1	
R-236	R-270 KΩ ± 10%	BC-0.25A-270 KΩ ± 10%	1	
R-237	R=100 KΩ ± 10%	BC-0.25A-100 KΩ ± 10%	1	
R-238	R=62 KΩ ± 10%	BC-0.25A-62 KΩ ± 10%	1	
R-239	R=100 KΩ ± 20%	BC-0.25A-100 KΩ ± 20%	1	

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1	2	3	4	5
R-240	R=1 MΩ ± 20%	BC-0.25A-1 MΩ± 20%	1	
R-241	R-100 KΩ ± 20%	BC-0.25A-100 KΩ ± 20%	1	
R-242	R=470KΩ ± 10%	BC-0.25A-470 KΩ ± 10%	1	
R-243	R=1.8 KΩ ± 10%	BC-0.25A-1.8 KΩ± 10%	1	
R-245	R=10 KΩ ± 10%	BC-0.25A-10 KΩ ± 10%	1	
R-246	R=10 KΩ ± 10%	BC-0.25A-10 KΩ ± 10%	1	
R-247	R=3.9 KΩ ± 10%	BC-0.25A-3.9 KΩ ± 10%	1	
R-248 x)	R=1.5 KΩ ± 10%	BC-0.25A-1.5 KΩ ± 10%	1	To be adjusted from 1.2 to 2.2 kilohms
R-249	R=4.7 KΩ, variable	СП-1-2А-4.7 KΩ-А-13	1	
R-251	R=47 KΩ± 10%	BC-0.25A-47 KΩ ± 10%	1	
R-251	R=5.1 KΩ ± 10%	BC-0.25A-5.1 KΩ ± 10%	1	
R-252	R=220Ω ± 10%	BC-0.25A-220Ω ± 10%	1	
R-253	R=4.7 KΩ ± 10%	BC-0.25A-4.7 KΩ ± 10%	1	
R-261	R=1.5 Ω		1	
R-262	R=2 Ω		1	
R-264	R=25 Ω		1	
R-265	R=1 KΩ ± 10%	BC-0.25A-1 KΩ ± 10%	1	
R-266	R=25 Ω		1	
R-267	R=18 Ω		1	
R-268	R=20 Ω		1	

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1	2	3	4	5
	Condensers			
C-201	Variable		1	C=9-42 pF
C-202	Trimming		1	$C_{max.}$=9 pF
C-203-1	C=1,000 pF ± 20%	КСО-2-500-Б-1,000-III	1	
C-203-2	C=1,000 pF ± 20%	КСО-2-500-Б-1,000-III	1	
C-203-3	C=1,000 pF ± 20%	КСО-2-500-Б-1,000-III	1	
C-203-4	C=1,000 pF ± 20%	КСО-2-500-Б-1,000-III	1	
C-203-5	C=1,000 pF ± 20%	КСО-2-500-Б-1,000-III	1	
C-203-6	C=1,000 pF ± 20%	КСО-2-500-Б-1,000-III	1	
C-203-7	C=1,000 pF ± 20%	КСО-2-500-Б-1,000-III	1	
C-203-8	C=1,000 pF ± 20%	КСО-2-500-Б-1,000-III	1	
C-203-9	C=1,000 pF ± 20%	КСО-2-500-Б-1,000-III	1	
C-203-10	C=1,000 pF ± 20%	КСО-2-500-Б-1,000-III	1	
C-203-11	C=1,000 pF ± 20%	КСО-2-500-Б-1,000-III	1	
C-203-12	C=1,000 pF ± 20%	КСО-2-500-Б-1,000-III	1	
C-204	C=4 pF ± 10%	КТК-1-Д-4-II	1	
C-205	Trimming		1	$C_{max.}$=9 pF
C-206	Variable		1	C-9-42 pF
C-207	C=4 pF ± 10%	КТК-1-Д-4-II	1	
C-208	C=4 pF± 10%	КТК-1-Д-4-II	1	
C-209	C=4 pF± 10%	КТК-1-Д-4-II	1	
C-210	C=4 pF±10%	КТК-1-Д-4-II	1	

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1	2	3	4	5
C-211	Trimming		1	$C_{max.}$=9 pF
C-212	Variable		1	C=9-43 pF
C-213	Variable		1	C=9-47 pF
C-214	Trimming		1	$C_{max.}$=9 pF
C-215	Trimming		1	$C_{max.}$=9 pF
C-216	Variable		1	C=9-47 pF
C-217	C=4 pF±10%	КТК-1-Д-4-II	1	
C-218	Trimming		1	$C_{max.}$=9 pF
C-219	Variable		1	C=9-47 pF
C-220	C=47 pF±10%	КТК-1-Д-47-II	1	
C-221	C=43 pF±10%	КТК-1-Д-43-II	1	To be adjusted from 6 to 10 pF
C-222	C=8 pF±10%	КТК-1-Д-8-II	1	
C-223	C=6 pF±10%	КТК-1-Д-6-II	1	To be adjusted from 4 to 8 pF
C-238	C=0.25 μF±20%	КБГ-$М_1$-200-0.25	1	
C-239	C=6,800 pF±20%	КСО-5-500-Б-6,800-III	1	
C-240	C=6,800 pF±20%	КСО-5-500-Б-6,800-III	1	
C-241	C=62 pF±5%	КСО-1-250-В-62-1	1	
C-242	C=10 pF±10%	КТК-1-Д-10-II	1	
C-243	C=10 pF±10%	КТК-1-Д-10-11	1	
C-244	C=62 pF±5%	КСО-1-250-В-62-1	1	

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1	2	3	4	5
C-245	C=6,800 pF±20%	КСО-5-500-Б-6,800	1	
C-246	C=6,800 pF±20%	КСО-5-500-Б-6,800	1	
C-247	C=62 pF±5%	КСО-1-250-В-62-I	1	
C-248	C=10 pF±10%	КТК-1-Д-10-II	1	
C-249	C=10 pF±10%	КТК-1-Д-10-II	1	
C-251	C=62 pF±5%	КСО-1-250-В-62-I	1	
C-252	C=6,800 pF±20%	КСО-5-500-Б-6,800	1	
C-253	C=6,800 pF±20%	КСО-5-500-Б-6,800	1	
C-254	C=6,800 pF±20%	КСО-5-500-Б-6,800	1	
C-255	C=1,000 pF±20%	КСО-2-500-Б-1,000	1	
C-256	C=6,800 pF±20%	КСО-5-500-Б-6,800-III	1	
C-257	C=62 pF±5%	КСО-1-250-В-62-I	1	
C-258	C=10 pF±10%	КТК-1-Д-10-II	1	
C-259	C=10 pF±10%	КТК-1-Д-10-II	1	
C-260	C=62 pF±5%	КСО-1-250-В-62-I	1	
C-261	C=6,800 pF±20%	КСО-5-500-Б-6,800-III	1	
C-263	C=6,800 pF±20%	КСО-5-500-Б-6,800-III	1	
C-264	C=51 pF±5%	КСО-1-250-В-51-I	1	
C-265	C=10 pF±10%	КТК-1-Д-10-II	1	
C-266	C=10 pF±10%	КТК-1-Д-10-II	1	
C-267	C=62 pF±5%	КСО-1-250-В-62-1	1	
C-268	C=180 pF±10%	КСО-1-250-В-180-III	1	
C-269	C=1,000 pF±20%	КСО-2-500-Б-1,000-III	1	

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1	2	3	4	5
C-270	C=6,800 pF±20%	КСО-5-500-Б-6,800-III	1	
C-271	C=6,800 pF±20%	КСО-5-500-Б-6,800-III	1	
C-272	C=1,000 pF±20%	КСО-2-500-Б-1,000-III	1	
C-273	C=100 pF±20%	КСО-2-500-Б-100-III	1	
C-274	C=6,800 pF±20%	КСО-5-500-Б-6,800-III	1	
C-275	C=6,800 pF±20%	КСО-5-500-Б-6,800-III	1	
C-276	C=100 pF±20%	КСО-2-500-Б-100-III	1	
C-277	C=6,800 pF±20%	КСО-5-500-Б-6,800-III	1	
C-278	C=6,800 pF±20%	КСО-5-500-Б-6,800-III	1	
C-279	C=0.05 μF±20%	КБГ-$И_1$-200-0.05-III	1	
C-280	C=6,800 pF±10%	КСО-5-500-Б-6,800-II	1	
C-282	C=1,000 pF±20%	КСО-2-500-Б-1,000-III	1	
C-285	C=6,800 pF±10%	КСО-5-500-Б-6,800-II	1	
C-286	C=50 μF	КЭГ-1-В - $\frac{50}{50}$	1	
C-262-3	C=1,000 pF±20%	КСО-2-500-Б-1,000-III	1	
C-262-4	C=1,000 pF±20%	КСО-2-500-Б-1,000-III	1	
C-262-5	C=1,000 pF±20%	КСО-2-500-Б-1,000-III	1	
C-262-6	C=1,000 pF±20%	КСО-2-500-Б-1,000-III	1	
C-262-II	C=1,000 pF±20%	КСО-2-500-Б-1,000-III	1	
Тр-201	Interstage transformer		1	
Тр-202	Output transformer		1	

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1	2	3	4	5
	Coils			
L-201	Coupling		1	
L-202	Radio-frequency amplifier	L=0.046 μH	1	
L-203	Radio-frequency amplifier (RFA)	L=0.046 μH	1	
L-204	1st converter	L=0.144 μH	1	
L-205	Frequency multiplier	L=0.2263 μH	1	
L-206	Frequency multiplier	L=0.2263 μH	1	
L-207	Oscillator	L=2.036 μH	1	
L-208	Intermediate-frequency amplifier	L=2.28 μH	1	
L-209	Same	L=2.28 μH	1	
L-210	Same	L=2.28 μH	1	
L-211	Same	L=2.28 μH	1	
L-212	Same	L=2.28 μH	1	
L-213	Same	L=2.28 μH	1	
L-214	Same	L=2.28 μH	1	
L-215	Same	L=2.28 μH	1	
ФП4-201	Intermediate-frequency filter		1	
ФП4-202	Same		1	
ФП4-203	Same		1	
ФП4-204	Same		1	

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1	2	3	4	5
Фд-201	Aerial feeder		1	
Др-201	Quartz oscillator choke		1	
	Valves			
Л-201	Radio-frequency amplifier (RFA)	6Ж3П	1	
Л-202	1st converter	6Ж3П	1	
Л-203	2nd converter	6Ж3П	1	
Л-204	Frequency multiplier	6Ж3П	1	
Л-205	Quartz oscillator	6Ж3П	1	
Л-206	1st intermediate-frequency amplifier (IFA)	6К4	1	
Л-207	2nd IFA	6К4	1	
Л-208	3rd IFA	6К4	1	
Л-209	1st low-frequency amplifier (LFA) and detector	6Г2	1	
Л-210	2nd LFA	6П6С	1	
Л-211	Power amplifier	6Н7С	1	
	Automatic Control Equipment			
МУВ-201	Wave changing mechanism		1	
ПМ-201	Selector motor		1	

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1	2	3	4	5
H-201	Quartz crystal switch		1	
K-201	Reset button		1	
KH-201	"Earth" terminal		1	
P-201	Relay		1	
	Cable Connectors			
Ф-201	For 6 jacks		1	
Ф-202	For 10 jacks		1	
Ф-203	For 10 pins		1	
Ф-204	For 10 jacks		1	
Ф-205	Aerial		1	

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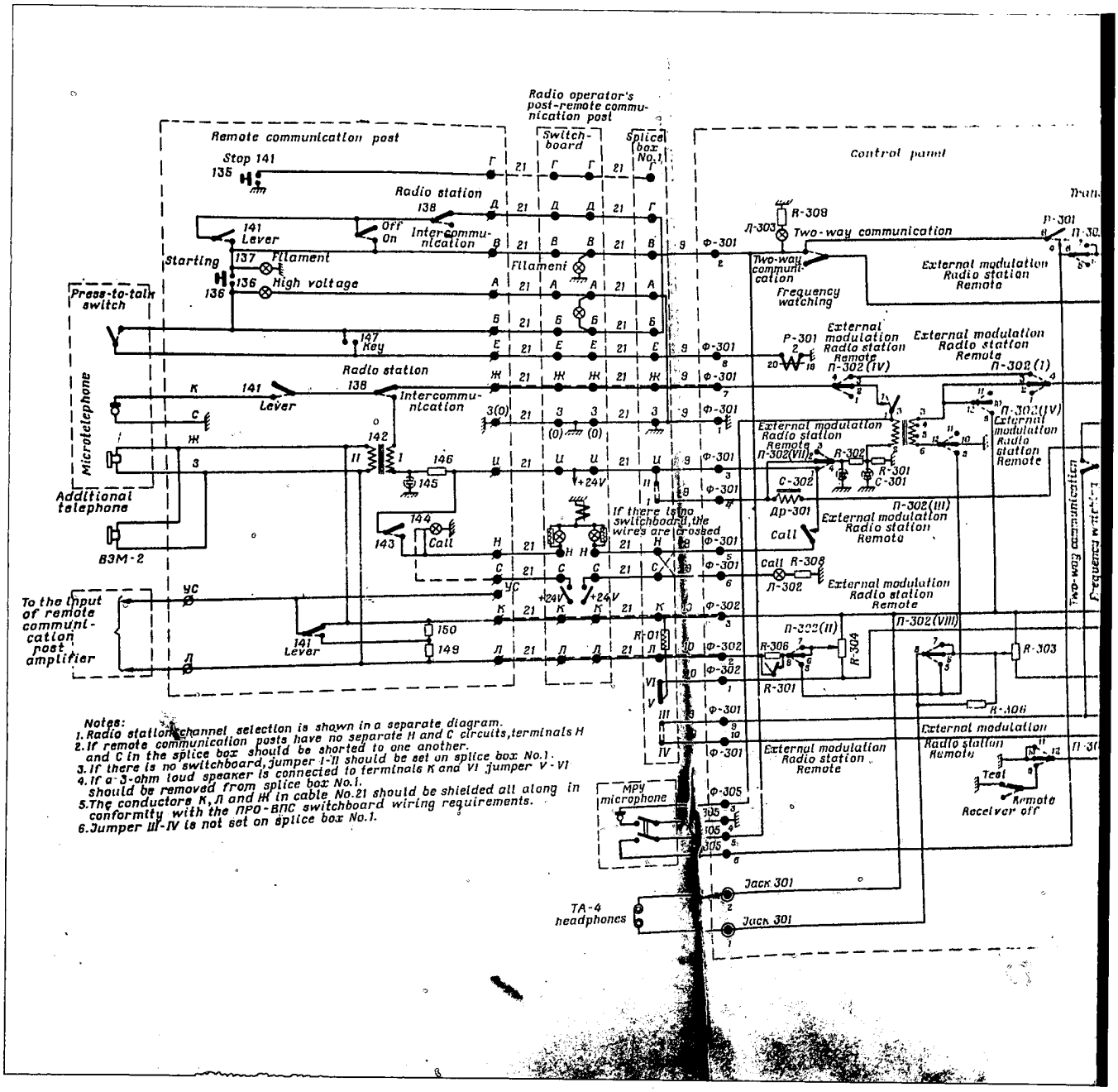

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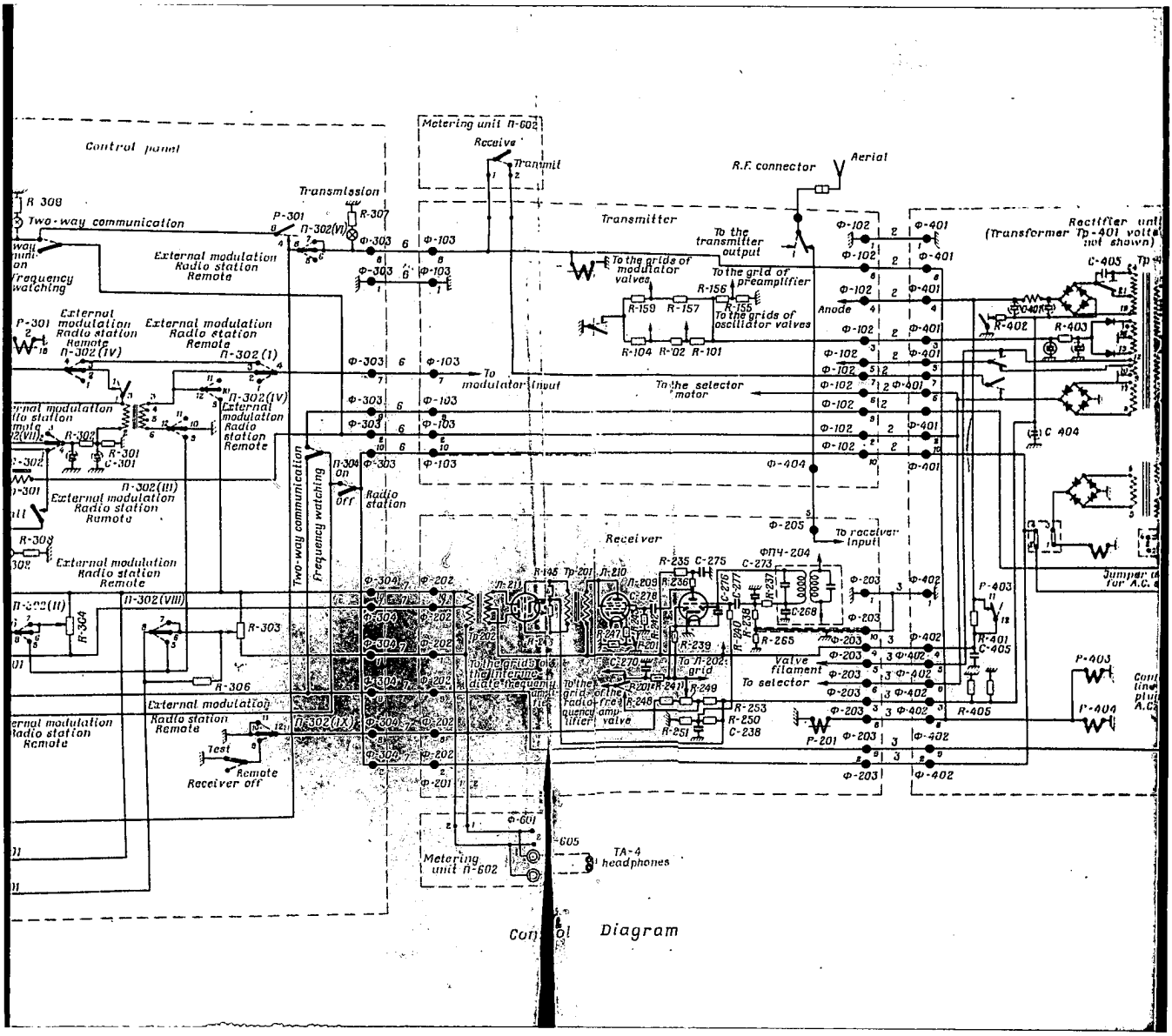

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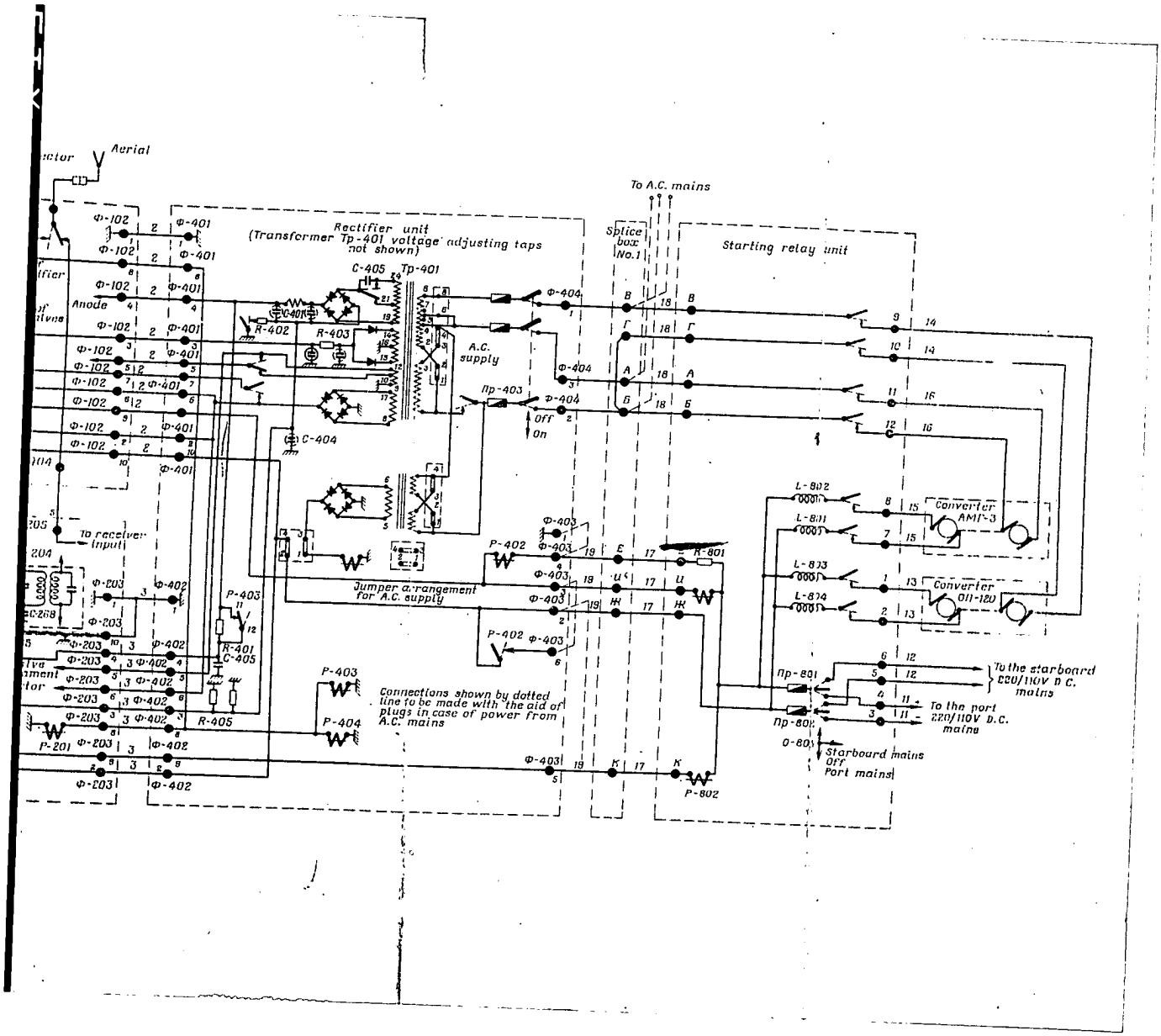
Aerial
To A.C. mains
Rectifier unit
(Transformer Tp-401 voltage adjusting taps not shown)
Splice box No.1
Starting relay unit
Anode
A.C. supply
Off
On
To receiver input
Jumper arrangement for A.C. supply
Connections shown by dotted line to be made with the aid of plugs in case of power from A.C. mains
Converter AMT-3
Converter 011-120
To the starboard 220/110V D.C. mains
To the port 220/110V D.C. mains
Starboard mains Off Port mains

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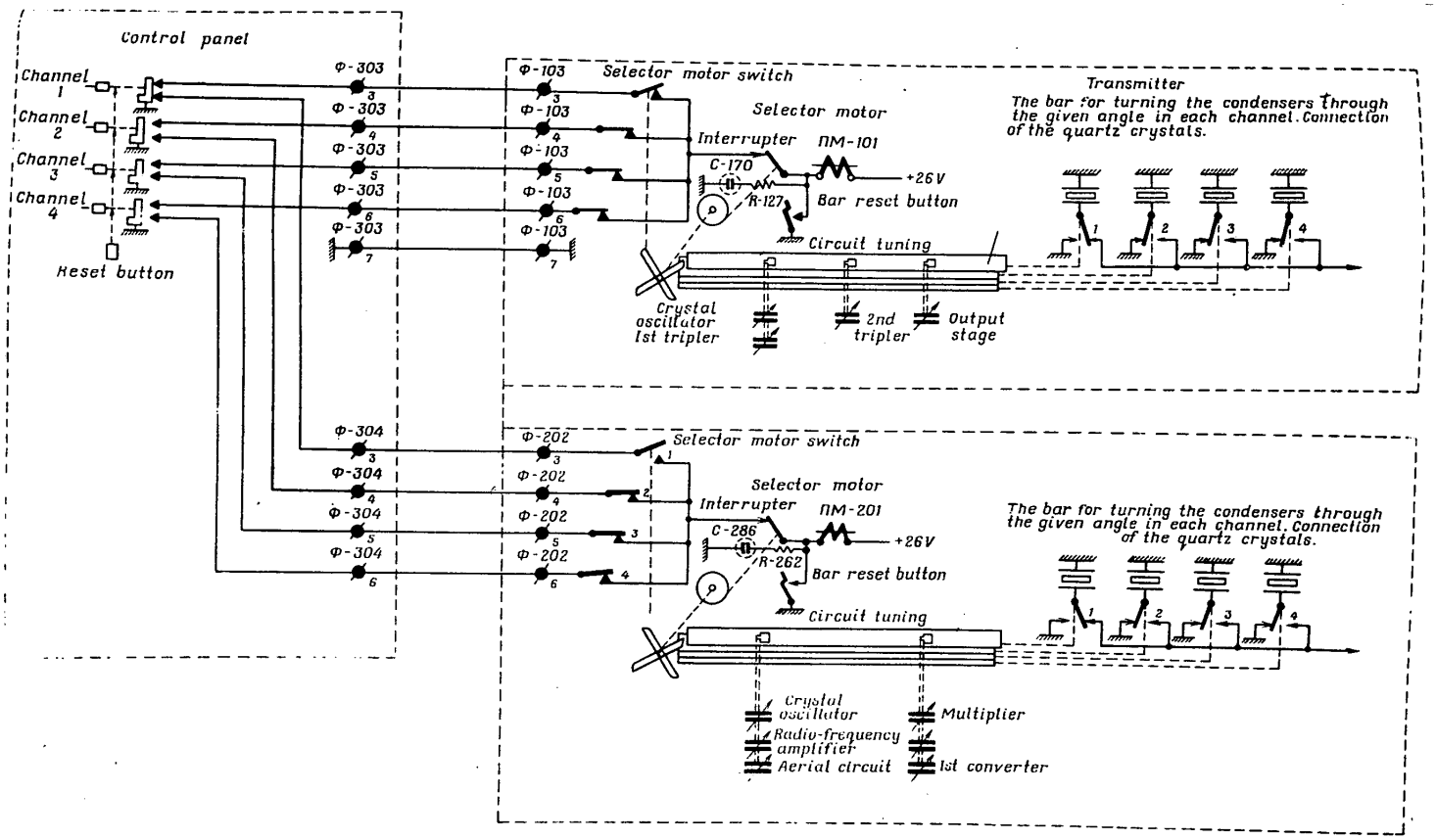

Channel Selection Diagram

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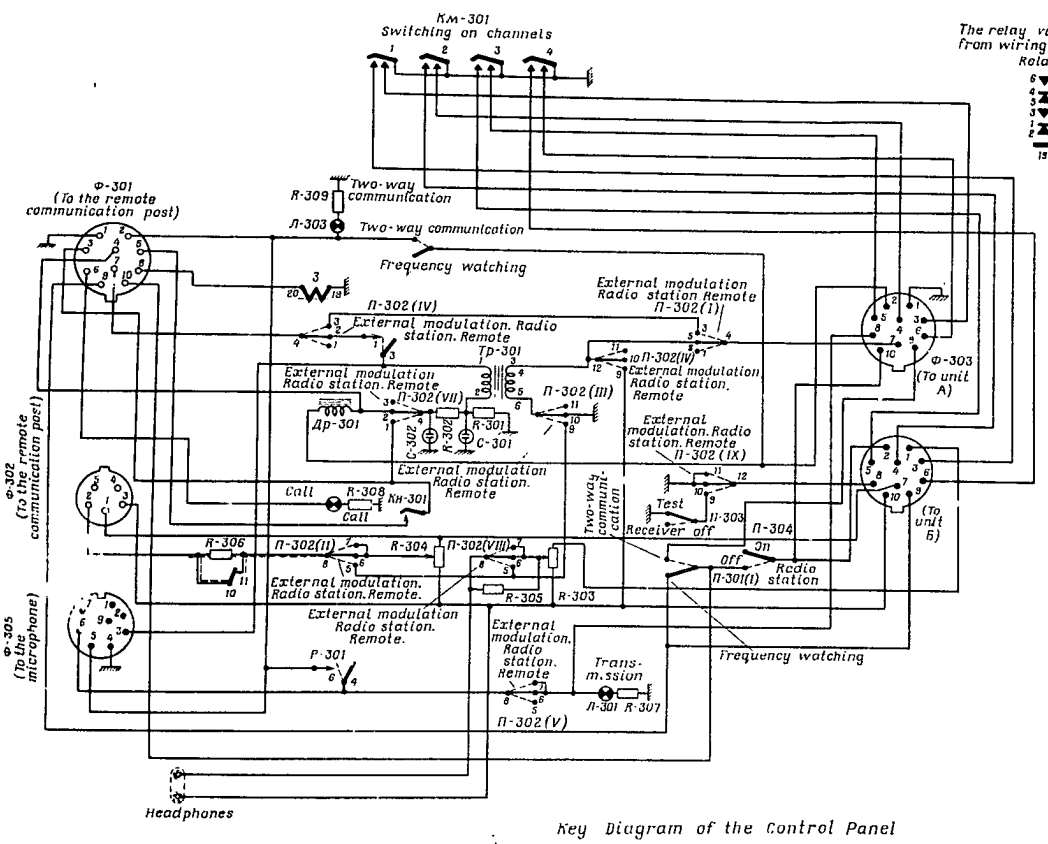

Key Diagram of the Control Panel

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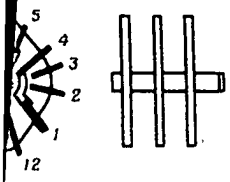
n of П-302 switch
rom Arrangement
side of assemblies



Ref. Nos	Name	Designation	Quantity
П-301	Toggle switch		1
П-302	Switch		1
П-303	Toggle switch		1
П-304	Toggle switch		1
Кн-301	Button switch		1
Р-301	Relay, type РС-13 20		1
R-301	Resistor 180 Ω ± 10%	ВС-0.5а-180 Ω ±10%	1
R-302	Resistor 270 Ω ±10%	ВС-2а-270 Ω ±10%	1
R-303	Variable resistor, 2.2 кΩ	СА-1-1в-2.2а	1
R-304	Variable resistor, 1 кΩ	СА-1-1а-1а	1
R-305	Resistor, 6.8 кΩ ±10%	ВС-0.25а-6,8 кΩ ±10%	1
R-306	Resistor, 2.2 кΩ ±10%	ВС-0.25а-2.2 кΩ ±10%	1
R-307	Resistor, 51 Ω ±10%	ВС-1а-51 Ω ±10%	1
С-301	Condenser, electrolytic, 50 μF ±20%	КЭГ-1-в-$\frac{50}{50}$ М	1
С-302	Condenser, electrolytic, 50 μF ±30%	КЭГ-1-в-$\frac{50}{50}$ М	1
R-308	Resistor, 51 Ω ±10%	ВС-1а-51 Ω ±10%	1
Тр-301	Microphone transformer		1
R-309	Resistor, 51 Ω ±10%	ВС-1а-51 Ω ±10%	1
Др-301	Choke		1
Л-303	Signalling lamp	26V×0.15A, type 17	1
Л-302	Signalling lamp	26V×0.15A, type 17	1
Л-301	Signalling lamp	26V×0.15A, type 17	1
Кн-301	Push-button mechanism		1

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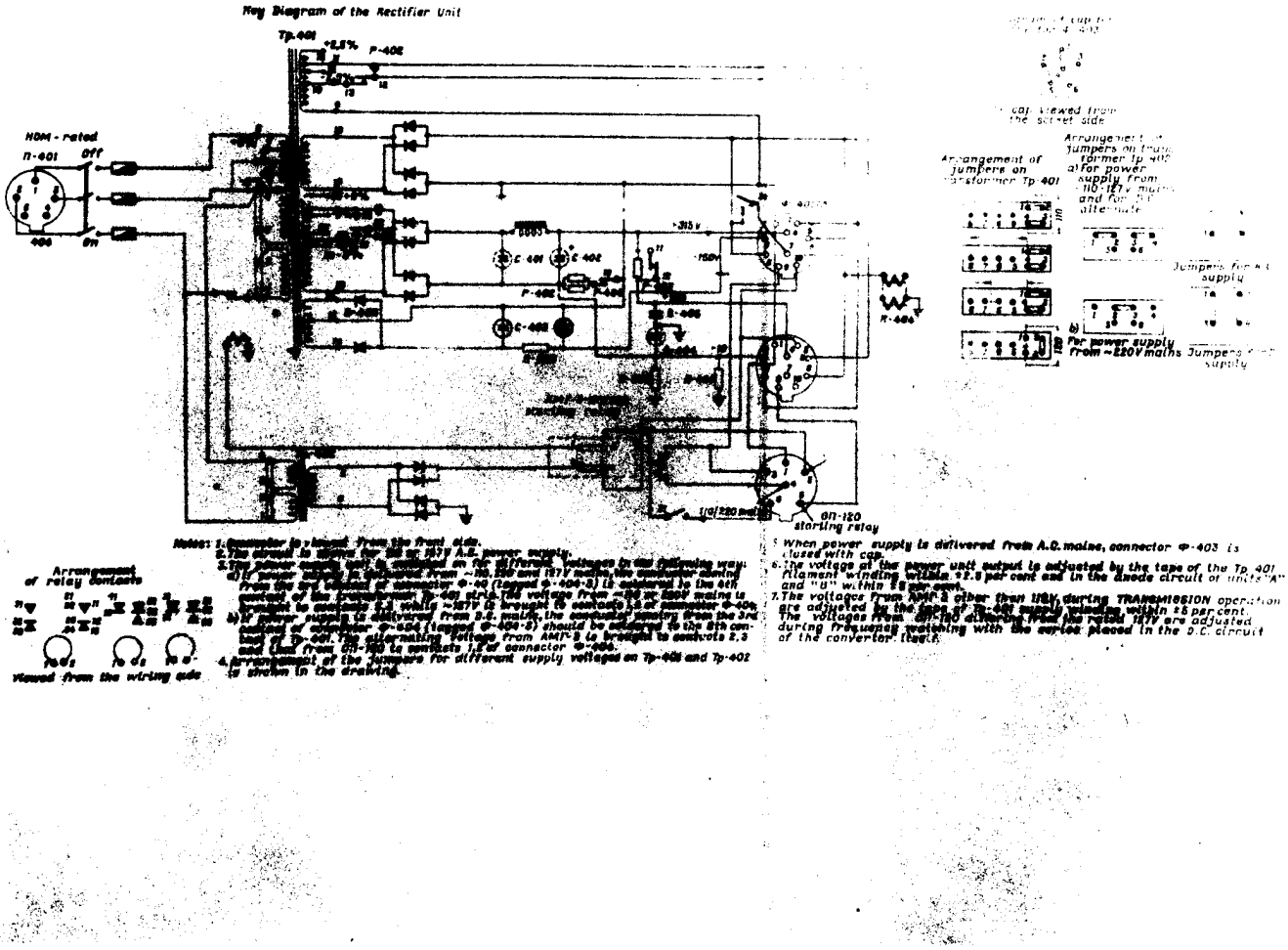
Key Diagram of the Rectifier Unit
Tp-401
P-402
HOM - rated
n-401
Off
On
C-401
C-402
C-403
R-404
GN-120
starting relay
Arrangement of relay contacts
Viewed from the wiring side
Arrangement of jumpers on transformer Tp-401
Jumpers for power supply from ~220V mains
Notes:
4. Arrangement of the jumpers for different supply voltages on Tp-401 and Tp-402 is shown in the drawing.
5. When power supply is delivered from A.C. mains, connector Φ-403 is closed with cap.
6. The voltage at the power unit output is adjusted by the taps of the Tp-401 filament winding within ±2.5 per cent and in the anode circuit of units "A" and "B" within 1% per cent.
7. The voltages from AMF-2 other than 115V during TRANSMISSION operation are adjusted by the taps of P-401 supply winding within ±5 per cent. The voltages from GN-120 delivering from the rated 115V are adjusted during frequency switching with the series placed in the D.C. circuit of the converter (Fig.6).

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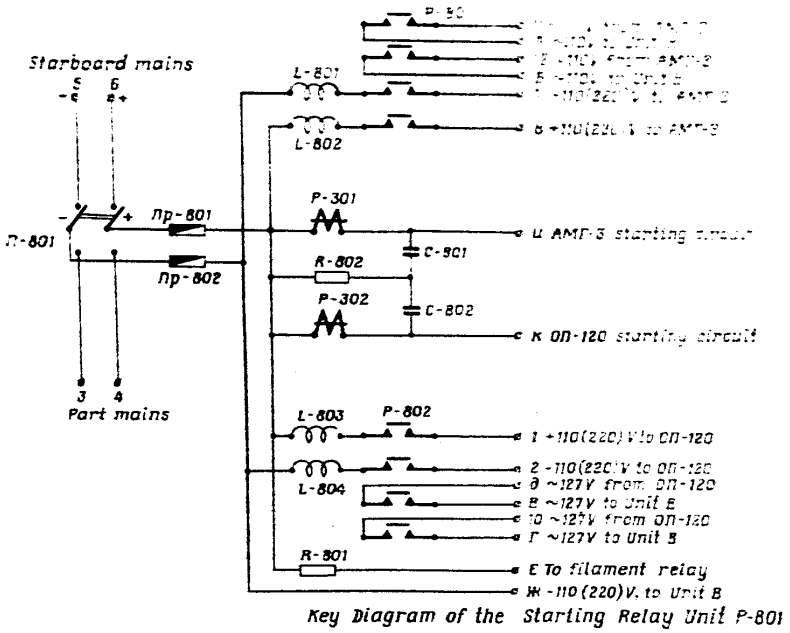

Key Diagram of the Starting Relay Unit P-801

Ref. No.	Name	Designation	No.
L-801	Spark inductor	Part of P-802	1
L-803	Spark inductor	Part of P-802	1
L-804	Spark inductor	Part of P-802	1
L-805	Spark inductor	Part of P-802	1
P-801	Resistor	Wire-wound: 1-1500 Ω ±5% 10 watts; 1-3500 Ω ±5% 25 watts	2
P-802	Relay	РП-31 40 ohm 0.05 A; РП-31 40 ohm 0.20 A	1
Пр-801	Fuse		1
Пр-802	Fuse		1
П-801	Packet-type switch	П-3-10-Н-11	1
С-801	Resistor	ВС-0.5А-18 Ω ±10%	1
С-801	Condenser	КБГ-МЧ-400-0.05-11	1
С-802	Condenser	КБГ-МЧ-400-0.05-11	1

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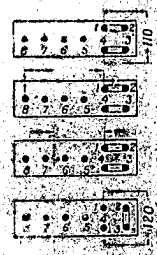
Diagram of cap for connector Ф-403

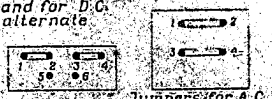
The cap viewed from the socket side

Arrangement of jumpers on transformer Tp-401



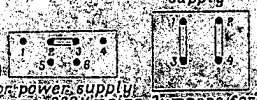
Arrangement of jumpers on trans-former Tp-402

a) for power supply from ~110-127 v mains and for D.C. alternate



Jumpers for A.C. supply

b) For power supply from ~220 V mains



Jumpers for D.C. supply

R-404

П-401	Switch	СГ/3с	1
П-401	Stabilovolt		1
К-401	Switch panel		1
Пр-403	Fuse	ПК-3А ℓ-43	1
Пр-402	Fuse	ПК-3А ℓ-43	1
Пр-401	Fuse	ПК-3А ℓ-43	1
R-405	Resistor	ВС-0.5а 15 кΩ ±10%	1
R-404	Resistor	ВС-2а-330 Ω ±5%	1
R-403	Resistor	ВС-2а-1600 Ω ±10%	1
R-402	Resistor	ВС-2а-100 Ω ±10%	2
R-401	Resistor	Wire-wound 1-2.500 Ω	1
C-406	Condenser	КБГ-МП-2V-600-0.25-III	1
C-405	Condenser	КБГ-МН-3-600-2к2-III	1
C-404	Condenser	КЭГ-1-V-$\frac{50}{50}$ M	1
C-403	Condenser	КЭГ-1-V-$\frac{150}{50}$ M	1
C-402	Condenser	КЭГ-1-V-$\frac{450}{20}$ M	1
C-401	Condenser	КЭГ-1-V-$\frac{450}{20}$ M	1
Др-401	Filter choke		
В-404	Selenium pile	АВС-35-17	1
В-403	Selenium pile	АВС-25-5	2
В-402	Selenium pile	АВС-45-М	4
В-401	Selenium pile	АВС-43	1
Р-404	Relay		1
Р-403	Relay		1
Р-402	Relay type РКМ	Coil НУ-171-80-27	1
Р-401	Relay type РКС for 20А		1
Тр-402	"Stand-by" transformer		1
Тр-401	Power transformer		1
	Name	Designation	Quan-tity

lay
supply is delivered from A.C. mains, connector Ф-403 ca
cap.
at the power unit output is adjusted by the tape of the Tp-401
nding within ±2.5 per cent and in the anode circuit of units A
hin ±5 per cent.
from AMГ-3 other than 115V, during TRANSMISSION operation
by the tape of Tp-401 supply winding within ±5 per cent
s from ON-120 differing from the rated 127V are adjusted
uency watching with the series placed in the D.C. circuit
erter itself.

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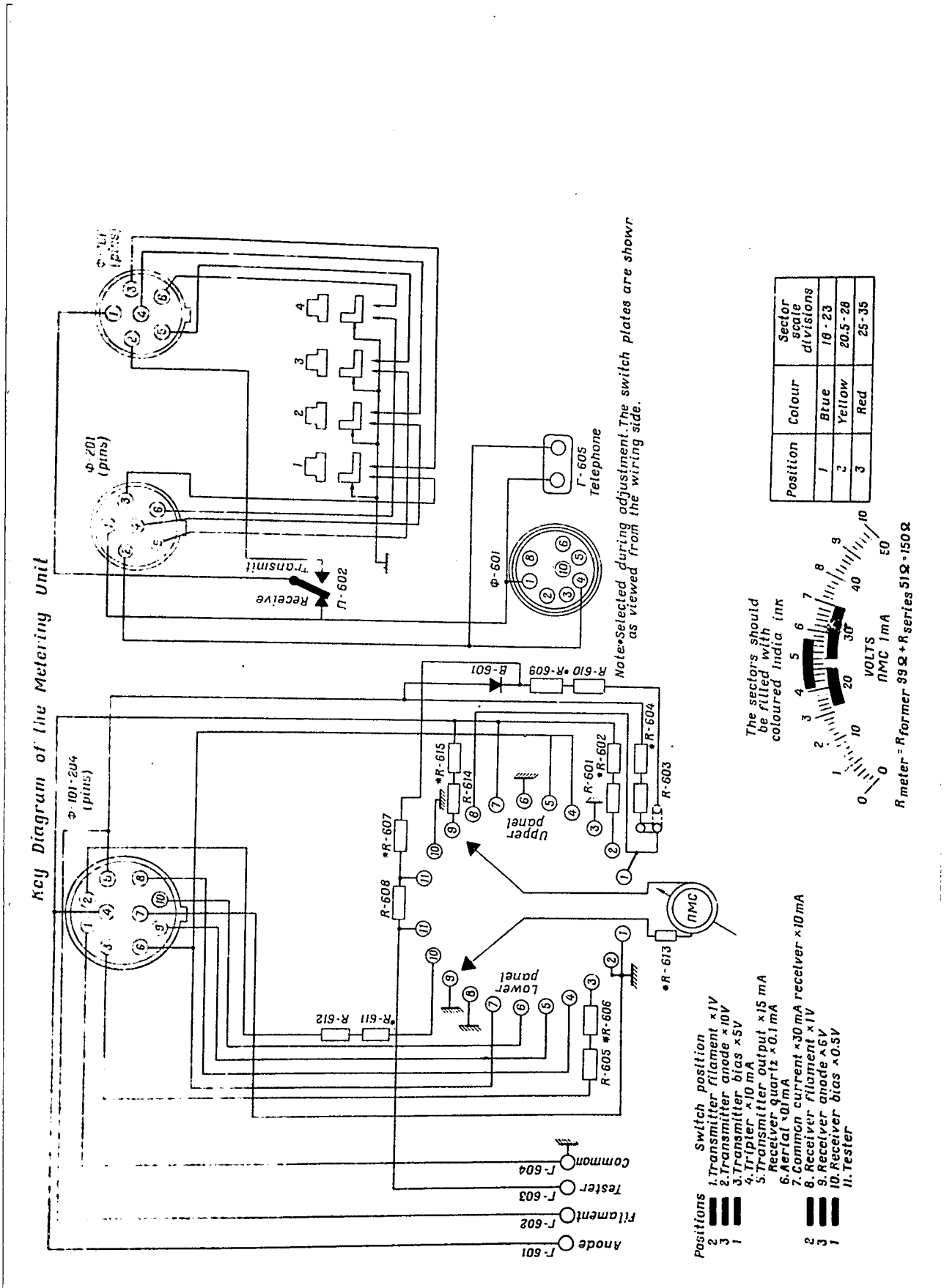

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SCHEDULE OF PARTS TO THE KEY DIAGRAM OF THE METERING UNIT

Ref. Nos	Name	Designation	Quantity	Note
1	2	3	4	5
Ф-201	Cable with connector		1	
Ф-106	Cable with connector		1	
Ф-101-204	Test cable		1	
КМ-601	Push-button mechanism		1	
Г-601	Terminal		1	
Г-602	Terminal		1	
Г-603	Terminal		1	
Г-604	Terminal		1	
Ф-601	Connector		1	
П-602	Toggle switch		1	
П-601	2-plate switch		1	
Пр-601	Motor		1	
	Resistors			
R-601	R-390 КΩ ±10%	ВС-1А-390 КΩ-II	1	
R-602 x)	R-120 КΩ ±10%	ВС-1А-120 КΩ-II	1	From 100 to 150 kilohms
R-603	R-39 КΩ±10%	ВС-0.5А-39 КΩ II	1	

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1	2	3	4	5
R-604 x)	R-11 KΩ ±10%	BC-0.5A-11 KΩ-II	1	From 9.1 to 12 kilohms
R-605	R-220 KΩ ±10%	BC-1A-220 KΩ-II	1	
R-606 x)	R-36 KΩ ±10%	BC-1A-36 KΩ-II	1	From 30 to 39 kilohms
R-607 x)	R-910 Ω ±10%	BC-0.5A-910Ω-II	1	From 820 to 1 kilohms
R-608	R-7.5 Ω		1	
R-609 x)	R-10 KΩ ±10%	BC-0.5A-10 KΩ-II	1	From 8.2 to 11 kilohms
R-610	R-8.2 KΩ ±10%	BC-0.5A-8.2KΩ-II	1	
R-611 x)	R-15 KΩ ±10%	BC-0.5A-15 KΩ-II	1	From 13 to 18 kilohms
R-612	R-10 KΩ ±10%	BC-0.5A-10 KΩ-II	1	
R-613 x)	R-91 Ω		1	
R-614	R-200 KΩ ±10%	BC-1A-200 KΩ-II	1	
R-615 x)	R-120 KΩ ±10%	BC-1A-120 KΩ-II	1	From 100 to 130 kilohms
T-605	Telephone jacks		1	
B-601	Selenium rectifier		1	

The resistors marked x) may have other ratings for which see the column "Note".

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ULTRASHORT-WAVE RADIO STATION
Type УКВ

DESCRIPTION AND OPERATING INSTRUCTIONS

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S e c t i o n I

DESCRIPTION

I. GENERAL

I-1 Equipment Supplied

The radio stations are available in two alternates:

(a) A l t e r n a t e I

The radio station is supplied from ship's 110, 127 or 220 V A.C. mains. It includes the following components (Fig.1):

1. Transmitter (unit A).
2. Receiver (unit Б).
3. Rectifier unit (unit В).
4. Control panel (unit ПУ).
5. Metering unit (unit И).
6. Aerial.
7. Mounting frame.
8. Set of junction cables.
9. Special (antiradar) filter ПЛФ.
10. Splice boxes.

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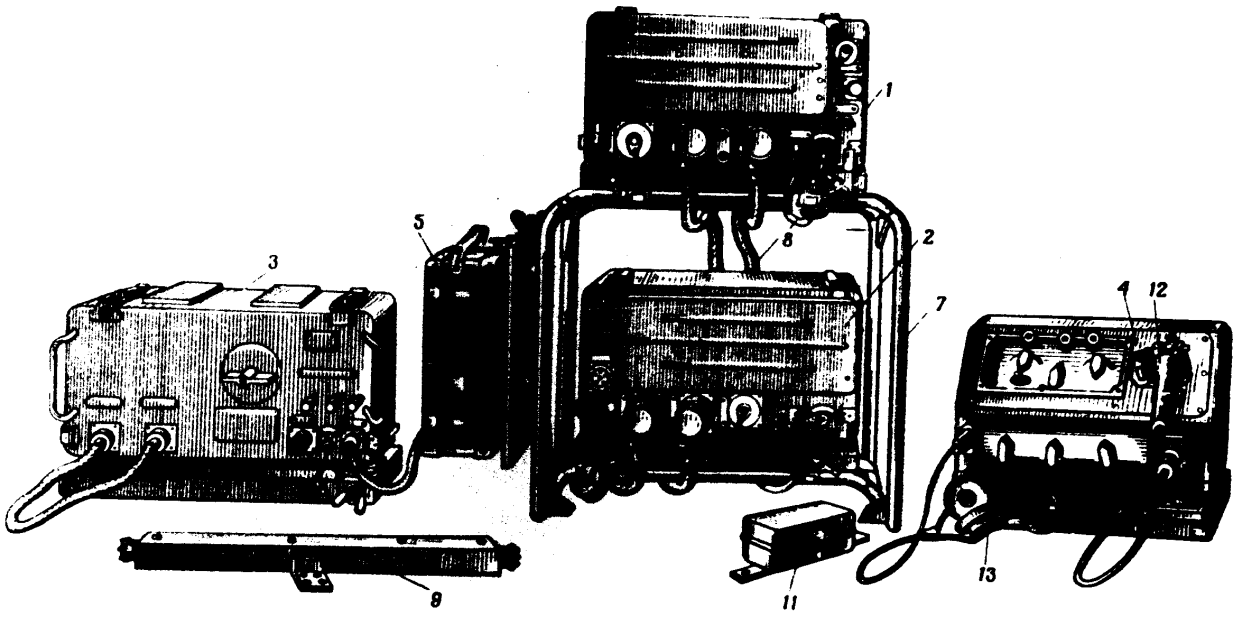

Fig. 1. General View of the Radio Station (A.C. Supply)

1 - transmitter; 2 - receiver; 3 - rectifier unit; 4 - control panel; 5 - metering unit; 7 - mounting frame; 8 - cables; 9 - special filter; 11 - box with quartz crystals; 12 - microphone; 13 - headphones.

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11. Quartz crystal set.

12. Microphone, type MPU.

13. Headphones, type TA-4.

14. Spares in a separate case.

15. Papers.

(b) A l t e r n a t e II

In addition to the components listed above for alternate I, the radio station supplied from ship's 110 or 220 V D.C. mains (Fig.2) comprises AMP-3 and OP-120 converters and a starting relay unit.

I-2 Construction

The radio station is made up of individual units: transmitter, receiver, rectifier, control panel, AMP-3 and OP-120 converters, and relay unit.

The device used for tuning the radio station is a portable metering unit.

The radio station aerial unit consists of an aerial, a symmetrical half-wave dipole and a coaxial aerial feeder.

The individual units are electrically connected with the aid of shielded junction cables provided with connectors.

The metering unit is connected to the receiver and transmitter with the aid of test cables plugged into the

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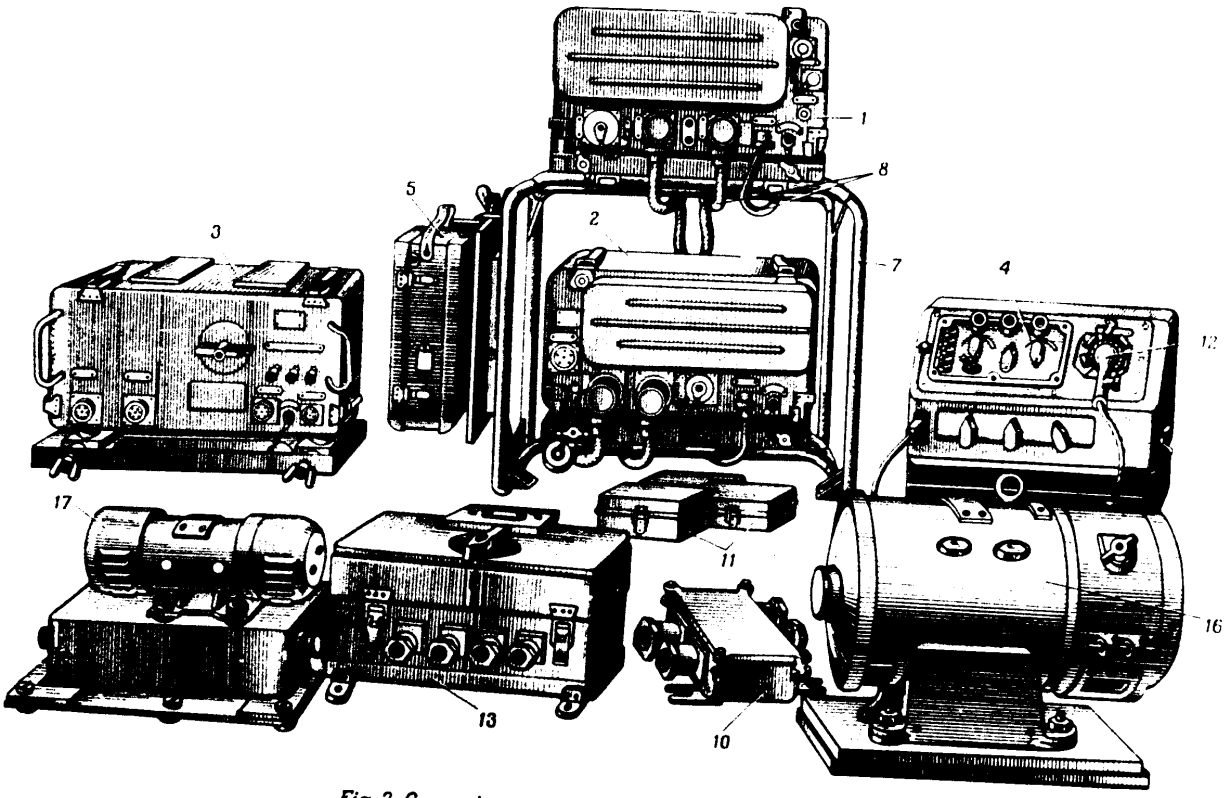

Fig. 2. General View of the Radio Station (D.C. Supply)

1-transmitter; 2-receiver, 3-rectifier unit; 4-control panel; 5-metering unit; 7-mounting frame; 8-cables; 10-splice box, 11-boxes with quartz crystals; 12-microphone; 16-converter АМГ-3; 17-converter ОП-120; 18-starting relay unit

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transmitter and receiver test jacks for measurements or tuning.

I-4 Brief Specification

(a) Frequency Range

The radio station has a frequency range from 100 to 150 kc/s (3-2 m.) with receiver and transmitter frequency crystal-controlled.

The radio station makes possible preliminary tuning to any of the four frequencies within this range and fixed-tuning communication in any of the four pre-set channels.

Operating frequencies for each channel are set by selecting appropriate crystals, and channels are automatically selected by pressing the appropriate button, on the control panel.

(b) Transmitter

The radio station transmitter output throughout the range is not less than 6 W.

The transmitter has amplitude anode-screen modulation. The transmitter is designed for repeated multiplication of the quartz master oscillator frequency.

(c) Receiver

The receiver sensitivity throughout the whole range is not worse than 10 microvolts. At two-fold attenuation

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the receiver band is not less than 120 Kc/s and at 100-fold attenuation, 300 Kc/s.

The receiver has automatic sensitivity control.

(d) Radio Station Control

The radio station is remote-controlled from the control panel. Power is applied to the station from the control panel: the radio station is ready for operation 1.5 min. after being switched on. Switching over from reception to transmission is effected by pressing the microphone press-to-talk switch. Switching from reception to transmission takes about 0.5 sec.

The station ensures radio communication from remote posts and telephone intercommunication as well as call signalling between the operators of the radio station control panel, the ship switchboard and the remote communication posts.

If a switchboard is available, telephone intercommunication and calls are ensured both when the radio station is on and off.

(e) Radio Station Power Supply

The radio station is supplied from the ship's 110, 127, and 220 V A.C. and 110 and 220 V D.C. mains.

The A.C. power supply system is based on the use of a relatively low-powered OП-120 converter for frequency

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watching and of a more powerful АПГ-3 converter for two-way communication.

The converters are switched over by remote control from the control panel with the aid of starting relays making up a separate unit.

During frequency watching the transmitter valves are heated at reduced voltage; full heating is switched on when the station is used for two-way communication.

When the ship's mains voltage is at its rated value, power consumption by the station is the following:

(a) A.C. alternate:

in transmission - 400 VA;

in ether watching - 115 VA.

(b) D.C. alternate:

in transmission - 750 W;

in ether watching - 280 W.

(f) A e r i a l U n i t

A half-wave dipole is used in the radio station. The aerial is coupled to the transmitter with the aid of a high-frequency aerial feeder.

II. DESIGN AND ELECTRICAL CHARACTERISTICS

II-1. Block Diagram

As may be seen from the block diagram (Fig.3), the radio station consists of four (A.C. alternate) or seven (D.C. alternate) units.

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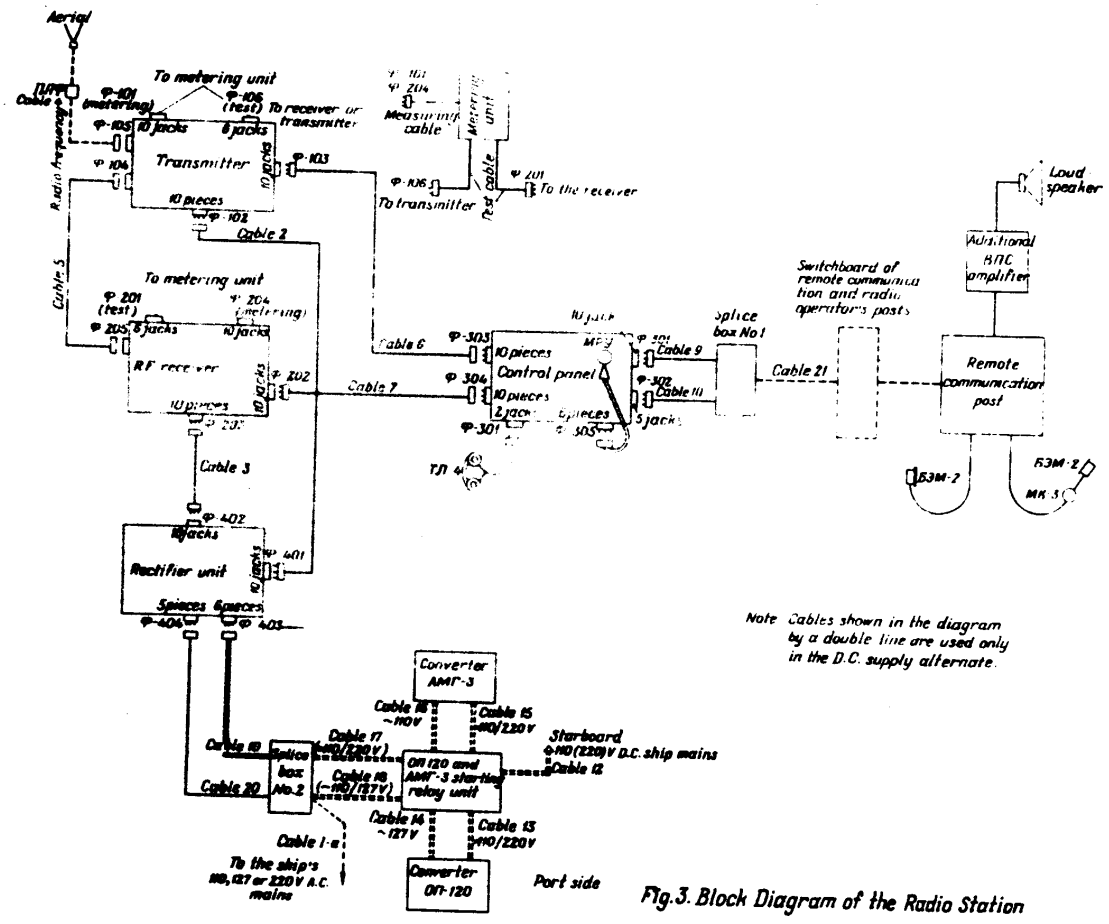

Fig. 3. Block Diagram of the Radio Station

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The individual assemblies are electrically connected with the aid of cables, as is schematically shown in the diagram.

II-2. Transmitter

The transmitter has four radio-frequency stages:

(1) Master oscillator doubler comprising a 6П6С (6V6) valve.

(2) First frequency tripler comprising a 6П6С (6V6) valve.

(3) Second frequency tripler comprising a ГУ-32 (832) valve.

(4) Power amplifier comprising a ГУ-32 (832) valve.

The transmitter block diagram is shown in Fig.4.

The master oscillator frequency is crystal-controlled with the crystal operating range from 5555.55 to 8333.33 Kc/s. All the transmitter stages, except the power amplifier, employ frequency multiplication.

The power amplifier is inductively coupled with the aerial. The aerial feeder is connected via aerial relay contacts.

The transmitter provides 18-fold frequency multiplication.

The quartz oscillator anode circuit is tuned to the second harmonic of the crystal. From the quartz oscillator

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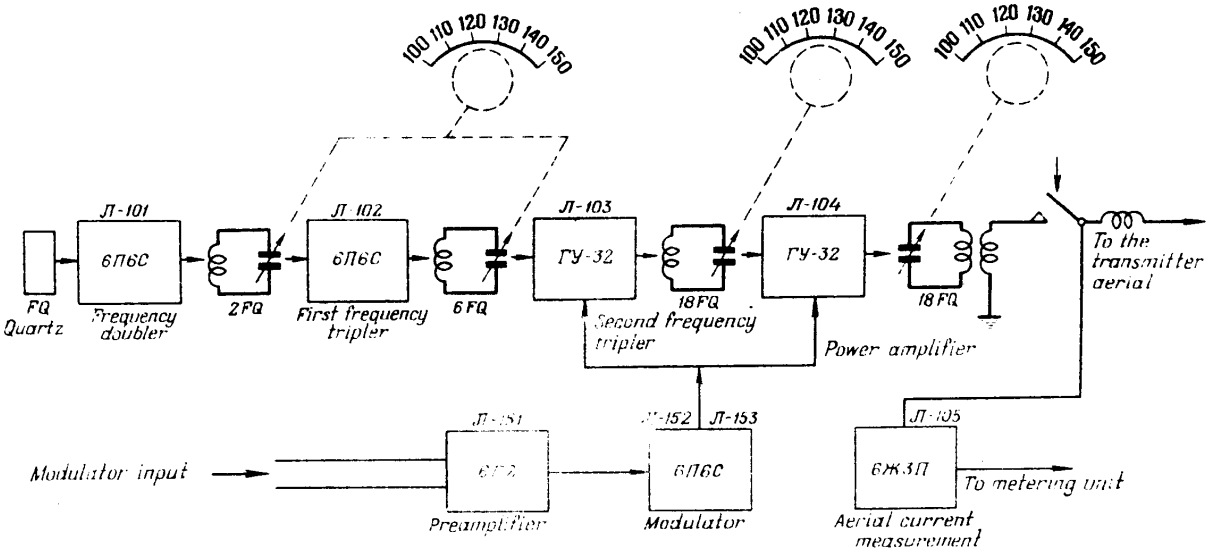

Fig. 4. Block Diagram of the Transmitter

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anode circuit voltage is fed to the grid of the first frequency tripler in whose anode circuit the 6th quarts harmonic is separated. From the anode circuit of the first frequency tripler voltage is impressed on the second tripler grid, in whose anode the 18th harmonic is separated (from 100 to 150 Mc/s).

From the second tripler circuit voltage is delivered to the push-pull power amplifier.

Tuning is effected by means of variable condensers.

To simplify tuning, the master oscillator and the first tripler condensers are combined into one unit and tuned with the same knob. The second tripler and the power amplifier circuit condensers are tuned separately - each with its own knob.

The modulation unit consists of:

(1) Low-frequency pre-amplifier comprising a 6Ж2 (6SQ7) valve.

(2) Modulator comprising two 6П6С (6V6) valves.

The transmitter uses amplitude modulation applied to the power amplifier anode and screen grid and to the second tripler screen grid.

The modulator employs a push-pull circuit.

Current in the transmitter aerial circuit is measured by detecting radio-frequency current with the aid of a 6Х3П (6AX5) valve.

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II-3. Radio Station Receiver

The radio station receiver is an eleven-valve telephone-type superheterodyne with quartz-crystal control.

The receiver block diagram is shown in Fig.5.

The receiver has the following stages:

(1) Radio-frequency amplifier comprising a 6Ж3П (6AK5) valve.

(2) First frequency converter comprising a 6Ж3П (6AK5) valve.

(3) Second frequency converter comprising a 6Ж3П (6AK5) valve.

(4) Crystal oscillator comprising a 6Ж3П (6AK5) valve.

(5) Multiplier of heterodyne frequency comprising a 6Ж3П (6AK5) valve.

(6) First intermediate-frequency amplifier comprising a 6K4 (6SG7) valve.

(7) Second intermediate-frequency amplifier comprising a 6K4 (6SG7) valve;

(8) Third intermediate-frequency amplifier comprising a 6K4 (6SG7) valve.

(9) Detector and first low-frequency amplifier comprising a 6Г2 (6SQ7) valve.

(10) Second low-frequency amplifier comprising a 6П6С (6V6) valve.

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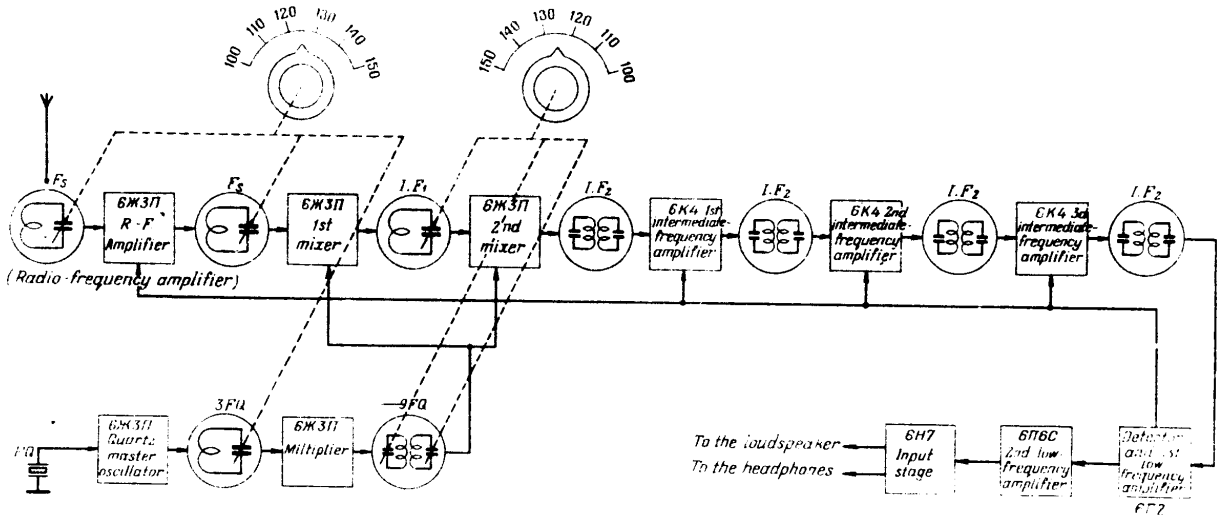

Fig.5. Block Diagram of the Re[illegible]

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(11) Final stage low-frequency amplifier comprising a 6H7C valve.

Amplified by the radio-frequency amplifier, the signal is fed to the 1st converter where after being mixed with the heterodyne frequency it produces the first intermediate frequency.

The quartz master oscillator and the frequency multiplier form the receiver heterodyne operating on a frequency corresponding to the 9th crystal harmonic. The receiver crystal operating range is from 4888.88 to 7666.66 Kc/s.

The first intermediate frequency is variable and depends on the frequency of the incoming signal. The first intermediate frequency is fed to the second converter where after being mixed with the same heterodyne frequency it produces the second intermediate frequency at which the main amplification of the signal takes place in the three stages of the intermediate-frequency amplifier.

As distinguished from the first intermediate frequency, the second one is constant throughout the whole range and equal to 12 Mc/s.

From the 3rd stage of the intermediate-frequency amplifier voltage is delivered to the receiver detector.

After being detected, the signal is amplified by two stages of the low-frequency amplifier and fed to the receiver output stage.

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II-4. Power Supply System

The radio station power supply system is designed for two types of supply current and therefore has two alternates.

The common feature in both alternates is the rectifying unit which consists of four selenium rectifiers and ripple filters.

According to their function the rectifiers are divided into high-voltage rectifiers (for feeding the receiver and transmitter anode and screen circuits), grid voltage rectifiers (for obtaining the necessary bias for the transmitter valves), low-voltage rectifiers (for feeding radio station automatic control circuits) and a stand-by rectifier (for feeding the starting relay which switches on the rectifier unit). The valve filaments are heated with alternating current supplied from the power transformer.

When the power is delivered from the ship's 110 and 220 V D.C. mains, the converters (ОП-120 for frequency watching and АМТ-3 for two-way communication) are used.

Both converters are single-armature machines which have D.C. and A.C. windings.

The АМТ-3 power unit converts 110 and 220 V D.C. into single-phase 110 V A.C.

The ОП-120 power unit converts the ship's mains 110 or 220 V D.C. into single-phase 127 V A.C.

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The generators of both OП-120 and AMT-3 converters are coupled to the leads of the corresponding rectifier power transformer via starting relay contacts.

II-5. Radio Station Control

The radio station control system ensures the following operations:

A. From Control Panel

1. Switching the station on.

2. Switching the station over from one channel to another.

3. Selecting the function of the radio station: two-way communication or frequency watching.

4. Two-way simplex radio communication with transmission through MPY microphone and reception through TA-4 headphones.

5. Calling the remote communication post by voice through the amplifier and loudspeaker supplied with the post and by sending a signal through the radio operator's post and remote communication switchboard.

6. Duplex telephone intercommunication from the remote communication post.

7. Volume control of reception through the control panel headphones.

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8. Volume control of reception through the loudspeaker of the remote-communication post.

B. From the Remote-Communication Post.

1. Two-way simplex radio-telephone communication with alternate connection of the receiver and transmitter;

2. Checking the radio operator's work.

3. Calling the radio operator by a light signal or by voice.

4. Telephone intercommunication with radio operator.

II-6. Channel Selection System

The main automatic components of the channel selection system are the selector motor (relay interrupter), selector bar mechanism, crystal selector switch and push-button mechanism.

The selector motor, selector bar mechanism and quartz selector switch are installed in the transmitter and the receiver; the push-button mechanism is mounted in the control panel.

The principle of operation of the automatic control system is shown in Fig.6.

The automatic control system operates as follows.

When one of the buttons of the push-button mechanism is pressed, the selector motor starting circuit is switched

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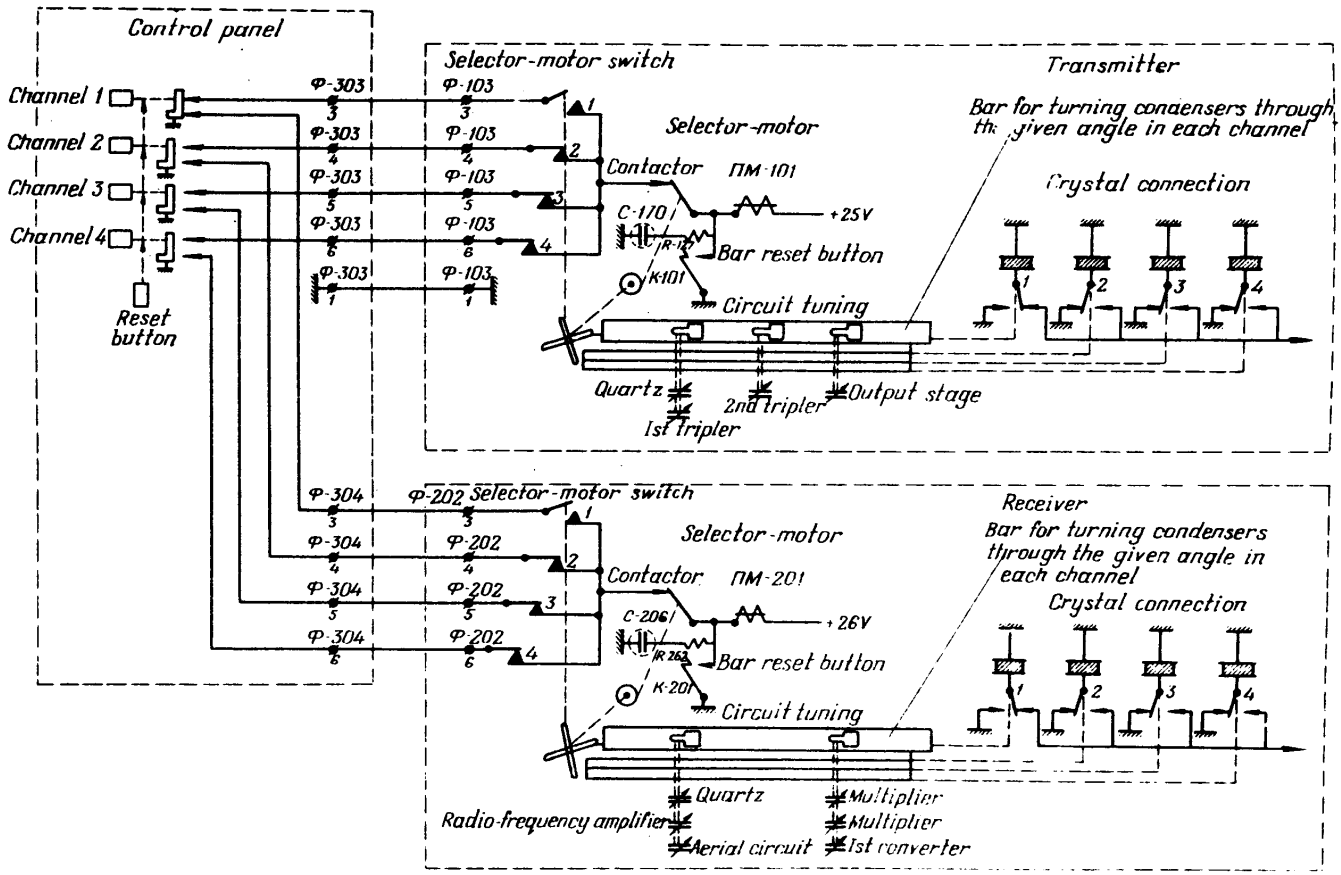

Fig.6. Channel Selection Diagram

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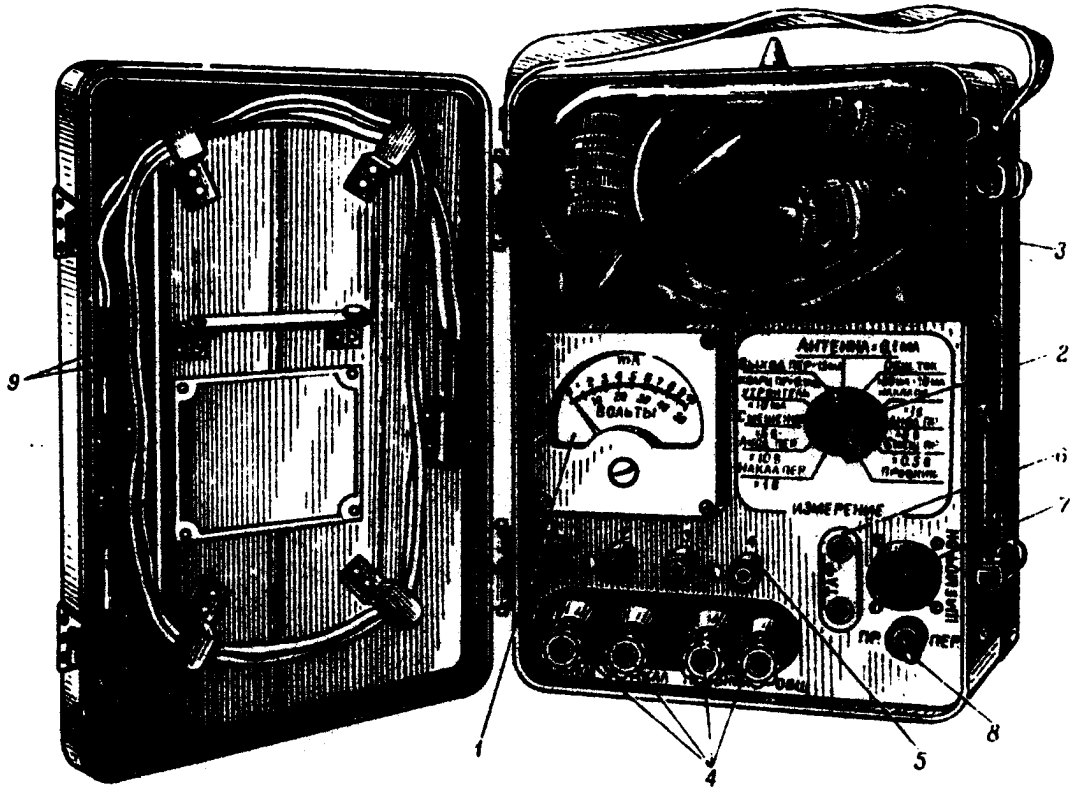

Fig. 7. Metering Unit

1-meter; 2-selector switch; 3-junction cables; 4-terminals; 5-push-button mechanism; 6-jacks; 7-plug; 8-receive-transmit switch; 9-probes.

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on. When the selector-motor is rotating, its cams move the channel selector bars. Having pushed on the bar which corresponds to the cut-in channel, the selector motor stops rotating, for the starting circuit is now broken by a cam resting at that moment on the switch spring assembly.

Having turned the mechanism shafts, the bar corresponding to the cut-in channel sets them in the pre-set tuning position.

The selector bar mechanism is coupled to the quartz selector switch which cuts in the appropriate quartz crystal when changing from one channel to another.

The variable condenser shafts are connected by flexible clutches to the shafts of the selector bar mechanism. When the shafts of the selector bar mechanism are turned, the condenser axles rotate, tuning the receiver and transmitter oscillating circuits.

II-7. Metering Unit

The metering unit (Fig.7) is the device for tuning and monitoring currents and voltages in the vital circuits of the radio station.

The device has two scales calibrated in volts and milliamperes.

For voltage measurements the device scale has coloured sectors which show the limits of permissible voltage variation.

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The following colour code is adopted for the scale: filament-yellow, anode-red, bias-blue.

As to accuracy the metering unit has a 3% tolerance for D.C.

The metering unit has a function switch which allows different measurements to be taken.

On its front panel the metering unit has terminals which allow the device to be used as a D.C. voltmeter with a scale for 50 and 500 V and also as a tester for detecting faults.

The push-button mechanism in the metering unit makes it possible to select the radio station channels without using the control panel.

With the aid of jacks on the unit front panel a TA-4 headphone is cut in, when the receiver is tuned.

III. DESCRIPTION OF CIRCUIT DIAGRAMS

III-1. Description of Transmitter Circuit

The transmitter diagram provides 18-fold frequency multiplication so that the operating frequency range often lies within from 100 to 150 Mc/s.

All the stages, except the power amplifier, operate as multipliers.

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1. Master Oscillator

The master oscillator employs a circuit with electron coupling and comprises 6П6С (Л-101) valve. In this system the quartz together with condensers C-101 and C-102 makes up the oscillating circuit placed between the valve control grid and the earth.

The quartz generator anode circuit (variable condenser C-105, trimming condenser C-104 and inductance coil L-101) is tuned to the second quartz harmonic.

Doubled quartz frequency oscillations are fed via coupling condenser C-106 and resistors R-108 to the control grid of the next stage - frequency tripler.

Valve Л-101 cathode includes a radio-frequency choke Др-101 and resistor R-120.

The choke serves for separation of A.C. from D.C. Resistors R-120 and R-106 serve for obtaining the necessary self-bias voltage.

Choke Др-108 is designed to facilitate the quartz operation.

Voltage is impressed on the valve screen grid via resistor R-107. C-103 is a radio-frequency by-pass condenser.

2. First Tripler

From the master oscillator anode voltage is applied via condenser C-106 to the grid of the first frequency tripler.

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The stage employs a 6П6С valve (Л-102) and operates as a separately-excited generator. The circuit C-105a, C-111 and L-102 in the valve anode is tuned to the 3rd harmonic of the frequency applied to the grid, or to the 6th quartz harmonic. Power to the valve anode is delivered via coil L-102 centre tap.

The centre tap is earthed for radio frequency via condenser C-113.

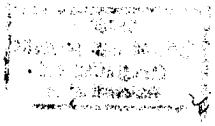
To level out the capacitance of the valve connected to one of the circuit arms, balanced condenser C-109 is connected to the other arm. The screen voltage is fed via resistor R-109. The screen grid is by-passed for radio frequency by condenser C-110.

Resistors R-121 and R-117 serve for obtaining the necessary self-bias voltage. Resistor R-108 is a grid suppressor and protects the stage against self-excitation.

The condensers of the 1st and 2nd stages are ganged and rotated by the same knob. The oscillations formed in the circuit are fed via coupling condensers C-114 and C-115, to the grids of the second frequency tripler valves.

3. Second Frequency Tripler

The second frequency tripler employs a push-pull circuit and includes a ГУ-32 (Л-103) valve.



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A by-pass 60-pF condenser is located inside the valve between the screen and the cathode. The valve filament is composite: for 12.6 V and 6.3 V. In the transmitter the filament is switched for 12.6 V.

In the second tripler stage further amplification and multiplication of quartz oscillation frequency take place, that is the 18th quartz harmonic is separated. The circuit (C-118, L-103) serves as the anode load. It is tuned to the 3rd harmonic of the previous stage frequency thus permitting the 100-150 Mc/s frequency range to be covered.

Radio frequency is delivered to the valve anodes via resistor R-124 and choke Др-102.

The rotor of the variable condenser is earthed for radio frequency. The bias is taken to the control grids from the divider R-101-102-104 and fed via resistors R-128 and R-129 and chokes Др-103-104 . The chokes are shunted at the input by condensers C-116, C-117.

Voltage to the screen grid is delivered via resistor R-130, which is included in the secondary winding of the [illegible] transformer. The anode supply circuit includes shunt R-116 connected in series with the anode circuit and enabling the anode current of the second tripler to be measured with the aid of the metering unit. From the second tripler anode circuit the radio-frequency oscillations are fed via condensers C-119 and C-120 to the power amplifier control grids.

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4. Power Amplifier

Similar to the second tripler the power amplifier includes a ГУ-32 (Л-104) valve and employs a push-pull circuit. The valve load is formed by the circuit C-123, L-104, which is connected to the valve anodes.

Voltage is delivered to the valve anodes by a series power supply system via choke Др-107. Voltage to the screen grid is fed via parallel resistors R-112 from the secondary winding of the modulation transformer.

Shunt R-119 is connected in series with the winding. It enables the power amplifier anode current and the currents of the power amplifier screen grids, and the 2nd frequency tripler to be measured with the aid of the metering unit. Bias is taken to the control grids from the divider composed of resistors R-101-102-104 and fed via resistor R-123. The control grid circuits include two chokes Др-105-106 by-passed by condensers C-133 and C-132; the inductance coil in the anode circuit has four turns with a gap in the middle. Placed in this gap is coupling coil L-105.

The coupling coil is connected to the coaxial aerial feeder.

For tuning the output stage (power amplifier) the transmitter circuit has a diode detector comprising a 6Ж3П (Л-105) valve whose anode, screen and control grids are

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connected to each other. The detector is coupled with the junction feeder via coil L-106, a feeder section and coil L-107. The coil L-107 levels out the characteristics of the voltage detected. When the radio frequency reaches the diode, it is detected and causes on the detector made up of resistors R-113-114 a voltage drop, part of which is taken from resistor R-114 and fed to the metering unit for tuning.

Resistor R-126 and condenser C-138 make up the radio frequency filter.

5. Low-Frequency Pre-Amplification Stage

Pre-amplification of low frequency is effected in the low-frequency double diode-triode of the 6N2 type (L-151).

The audio oscillations, delivered to the primary winding of the input transformer Tp-151, are applied from its secondary winding to the grid of valve L-151.

The primary winding of transformer Tp-151 is shunted by resistor R-121.

The secondary winding of transformer Tp-151 is shunted by resistor R-152 which reduces voltage on the transformer secondary winding.

To reduce non-linear distortions and increase gain stability, negative feedback is effected via condenser C-153 and resistor R-153.

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Condenser C-153 in the feedback circuit is an isolating one and serves to keep positive bias on the anode away from the valve grid.

The constant anode voltage is fed to the valve via the primary winding of transformer Tp-152. Resistor R-160 and condensers C-140 and C-141 form a decoupling filter in the anode circuit of the valve.

The bias voltage is taken from the divider consisting of resistors R-155, R-156 and is impressed via resistor R-154 on the control grid of valve Л-151 .

6. Modulator

The transmitter modulator employs a push-pull circuit and comprises low-frequency beam tetrodes 6П6С (Л-152, Л-153).

The control grids of the modulator valves 6П6С (Л-152 and Л-153) receive audio oscillations from the secondary winding of interstage transformer Tp-152.

The low-frequency oscillations, amplified by valves Л-152 and Л-153 , are applied to the secondary winding of modulation transformer (Tp-153), added to the constant anode and screen voltages of power amplifier (Л-104) and to the screen voltage of the transmitter second tripler.

Negative bias is fed to the grids of modulator valves Л-152 and Л-153 from the bias divider R-157,

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л-159 via the centre tap (4) of transformer Tp-152 secondary winding. Placed between the control grids of valves Л-152 and Л-153, in parallel with the secondary winding of the interstage transformer Tp-152, are condensers C-154 and C-156 which serve for additional clipping of the high-audio frequencies lying beyond the operating range.

Anode voltage is delivered to the valves via the centre tap (2) of the modulation transformer Tp-153 primary winding. Placed between the anodes of valves Л-152 and Л-153 is condenser C-155 which serves to clip the high-audio frequencies. Voltage is impressed on the modulator valve screen grids via resistor R-161. C-157 is a by-pass condenser.

III-2. Description of Receiver Circuit

1. Radio-Frequency Amplifier

The radio-frequency amplifier comprises radio-frequency pentode 6Ж3П (Л-201) and has in the grid and anode circuits oscillating circuits L-202, C-201 and L-203, C-206 tuned to the incoming signal frequency of 100-150 Mc/s.

Coupling of the input circuit with the aerial is inductive. On being received and amplified the signal voltage is applied from the anode circuit via coupling condenser C-207 to the control grid of the 1st converter for further amplification and conversion.

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The stage has a series power supply circuit. Supply voltage is routed to the anode and screen grid via resistor R-203. C-203-1, C-203-2, and C-203-3 are by-pass condensers. Negative bias is delivered to the control grid via the automatic control circuit from voltage divider R-253, R-249 and R-248 via the spring assembly of relay P-201.

2. 1st Converter

The purpose of the 1st converter is to convert the radio-frequency signal voltage into the voltage of the first intermediate frequency.

For this purpose voltage of two frequencies is brought to the electrodes of 6ЖЗП valve (Л-202): signal voltage in the range of 100-150 Mc/s and heterodyne voltage of 44-69 Mc/s. The signal voltage reaches the valve control grid via condenser C-207 from the anode circuit of the radio-voltage amplifier. The heterodyne voltage is impressed on the screen grid from the filter second circuit included in the anode circuit of the frequency multiplier. As a result of interaction between the voltages of these frequencies a voltage of difference frequency from 56 to 81 Mc/s is formed in the anode circuit of the 1st converter.

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The anode circuit of the 1st converter is tuned to this frequency range. It consists of inductance coil L-204 and variable condenser C-212.

To the control grid of valve Л-202 constant bias voltage is fed from voltage divider R-247, R-249 and R-253. Through resistor R-206 supply voltage is delivered to the valve anode and via resistor R-210, to the screen grid (through the spring assembly of relay P-201).

3. 2nd Converter

The purpose of the 2nd converter is to convert the voltage of the first intermediate frequency into that of the second intermediate frequency (12 Mc/s).

The stage employs a 6Ж3П pentode (Л-203). Voltage of first intermediate frequency (56-81 Mc/s) is applied to the control grid of the valve via isolating condenser C-210 from the anode circuit of the 1st converter, while the heterodyne voltage (44-69 Mc/s) is fed via condenser C-209. As a result of interaction between both frequencies the voltage of the second intermediate frequency is formed in the anode circuit of the 2nd converter.

The necessary bias voltage fed to the grid of 6Ж3П valve is produced by the grid current flowing through resistor R-207.

Supply voltage is delivered to the anode and screen grid via resistor R-217, R-218 and R-209, respectively.

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4. Crystal Oscillator

The crystal oscillator comprises valve 6Ж3П (Л-205) and simultaneously performs two functions: that of oscillator and that of frequency multiplier.

The screen grid of the valve serves as the anode in that part of the circuit which is a self-oscillator, and the anode circuit of the valve is used for frequency multiplication. Both parts of the circuit are coupled to each other via the valve electron flow.

The oscillating circuit L-207, C-219 is tuned to the 3rd quartz harmonic.

The anode and the screen grid are fed via resistor R-215. C-203-12 is a by-pass condenser.

The circuit of the anode current direct component is closed via resistor R-252 and radio-frequency choke Др-201 included into the valve cathode.

5. Frequency Multiplier

The frequency multiplier comprises valve 6Ж3П (Л-204). Via isolating condenser C-217 the voltage is fed to the multiplier grid from the crystal oscillator. The multiplier anode circuit includes band filter L-206, C-216, L-205, C-213 tuned to the 3rd harmonic of the frequency applied to the grid, i.e. to the 9th quartz harmonic.

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The initial bias is applied to the valve control grid as a result of a voltage drop on resistor R-208 included in the valve cathode.

Supply voltage is delivered to the anode screen grid via resistors R-211 and R-212, respectively.

C-203-9, C-203-10 and C-203-11 are by-pass condensers. The anode circuit includes shunt R-264 for measuring the anode current of the valve with the aid of the metering unit in QUARTZ (КВАРЦ) position. According to the meter readings the crystal oscillator circuit can be tuned to resonate as the direct component of the multiplier anode current increases as the voltage, applied to the multiplier valve grid from the crystal oscillator, grows.

The variable condensers of the crystal oscillator and R.F. amplifier anode circuits are ganged on the same shaft and tuned simultaneously.

6. Intermediate-Frequency Amplification

The intermediate-frequency amplification in the receiver is provided by three stages comprising 6K4 valves (Л-206, Л-207 and Л-208). The intermediate-frequency is separated on two-circuit filters with inductive coupling between the coils tuned to 12 Mc/s.

The intermediate-frequency amplification stages employ a series power supply system. Supply voltage is delivered

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to the anodes and screen grids via resistors R-220, R-221, R-225, R-226, R-231 and R-232, respectively, and to the valve screen grids, via resistors R-224, R-229 and R-234.

C-246, C-252, C-256, C-261, C-254, C-271, C-263, C-269 and C-274 are by-pass condensers.

The bias voltage is delivered from the load of the automatic sensitivity control detector and from the voltage divider consisting of resistors R-249, R-253, R-248.

7. Automatic Sensitivity Control and Signal Detectors

From the second filter circuit placed in the anode circuit of the I.F. amplifier third stage the intermediate-frequency voltage is taken via condenser C-276 to the automatic sensitivity control detector.

The detector load is connected to the slider of variable resistor R-249, which makes possible variation of the initial negative voltage across the grids of valves Л-201, Л-202, Л-206 , Л-207 , Л-208, i.e. receiver sensitivity control.

The second circuit is also coupled to the second diode of valve 6Г2 which serves as the signal detector. As a result of detecting, the audio-frequency voltage is separated on the diode load R-237, R-238. Resistor R-265, connected in series with the above-mentioned resistors, is shorted

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in connector Ф-203-10 ; it is used in the M.T.B. alternate of the radio station.

C-268 and C-273 are by-pass condensers.

8. Low-Frequency Amplification

Low-frequency pre-amplification is effected by the triode section of valve 6Г2 (Л-209). Low-frequency voltage is delivered to the valve grid via isolating condenser C-277 from resistor R-238.

The necessary bias voltage is taken to the valve grid from voltage divider R-250 and R-251 and fed via resistor R-240.

Supply voltage to the valve anode is delivered via anode load R-236 and filter R-235, C-275.

The low-frequency voltage is impressed from the anode of valve 6Г2 on the control grid of the low-frequency pre-amplification stage employing valve 6П6С (Л-210) via isolating condenser C-278.

The stage has a negative feedback provided by resistor R-243 placed into the valve cathode circuit.

The anode circuit includes transformer Тр-201, whose secondary winding is connected to the grids of a 6Н7С (Л-211) valve.

The 6Н7С valve is a power amplifier of "B_2" class of operation.

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The anode circuit of valve 6H7C includes the primary winding of transformer Tp-202, from whose secondary winding the low-frequency output voltage is supplied via connectors Ф-202-1 , Ф-202-7 and Ф-202-10 to the control panel.

9. Automatic Sensitivity Control

The receiver uses delayed automatic sensitivity control.

The D.C. voltage of the signal detected is applied via decoupling circuit R-241 and C-279 to the control grids of valves Л-201 , Л-206 , Л-207 and Л-208. Delay is provided by feeding negative voltage from resistor R-249 to the anode of the A.S.C. detector diode.

III-3. Description of Control Circuit

As was mentioned above, the radio station can be operated both from the control panel and from remote communication posts.

In case of operation from remote communication posts the latter are selected and connected to the station by the switchboard operators at the radio operator's and remote communication posts.

The circuit makes it possible to make calls and carry on telephone intercommunication between the operators of the control panel and the ship's switchboard

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and after the connection has been made at the switchboard, with the remote communication post operator.

The album of radio station drawings and diagrams contains a key diagram of the control panel and the radio station control diagram, showing the connections between the control panel and the control and low-frequency circuits of the entire radio station.

The radio station control circuit will be discussed below.

1. Switching On Radio Station Power Supply during Frequency Watching

The radio station is switched on from the control panel by throwing the STATION (РАЦИЯ) switch (П-304) to ON (ВКЛ.) after switch П-301 has been set in FREQUENCY WATCHING (ДЕЖУРН. ПРИЕМ) position. As a result, different circuits are formed, depending on the power supply alternate.

(a) A.C. A l t e r n a t e

In the A.C. alternate the "stand-by" rectifier is energized; therefore, upon taking the appropriate steps, the following circuits is formed:

+26 V from the "stand-by" rectifier, jumper 3-4 and then through two parallel circuits via transmitter (connectors Ф-401-10 , Ф-102-10 , Ф-103-10 and Ф-303-10) and receiver (connectors Ф-402-2 , Ф-203-2 , Ф-202-2 and Ф-304-2) to switch П-304 (ON position), switch П-301 (group I, FREQUENCY

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WATCHING position), connectors Ф-304-9 , Ф-202-9 , Ф-203-9, Ф-403-9 and Ф-403-5 , jumper in the connector Ф-403-2 cap, jumper 2-1, relay P-401 winding, chassis.

When relay P-401 operates, its contacts switch on the ship's A.C. mains brought to the rectifier unit connector Ф-404 and to transformer Тр-401 which supplies the radio station anode, grid and low-voltage rectifiers.

During frequency watching the transmitter valves are at a reduced potential for relay P-402 does not operate and half of the transformer Тр-401 filament winding is coupled to the valves.

(b) D.C. A l t e r n a t e

In the D.C. alternate, when switches П-301 and П-304 are set in the appropriate positions mentioned, the starting relay circuit of converter ОП-120 is formed:

-220 (110) V from the ship's mains, terminal "5" of the starting relay unit, П-801 in STARBOARD MAINS (ПРАВАЯ Б.С.) position; fuse Пр-802; terminal "Ж" in the starting relay unit; terminal "Ж" of splice box No.2; connector Ф-403-2; jumper 2-4 and then through two parallel circuits via transmitter and receiver to switch П-304 (ON position); switch П-301 (assembly I, FREQUENCY WATCHING position); connectors Ф-304-9 ; Ф-202-9; Ф-203-9; Ф-402-9; Ф-403-5; terminal "К" of splice box No.2; terminal "К" of the starting relay unit;

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relay P-802 winding; fuse Пр-801 ; П-801 in STARBOARD MAINS position; terminal "6" of the starting relay unit and +220 (110) V of the ship's mains.

Relay P-802 switches on the ОП-120 converter motor and connects A.C. voltage from the ОП-120 generator to the rectifier unit.

Relay P-401 operates, as the voltage from the stand-by rectifier energizes its winding and feeds alternating voltage to transformer Тр-401 .

As in the D.C. alternate the transmitter valve filaments are at a reduced potential.

2. Switching On Radio Station for Frequency Watching

After power is applied to the radio station, as described in Para.I, switch П-802 on the control panel should be set in the STATION position.

Assembly VIII of switch П-802 in STATION position connects control-panel headphones to the receiver output with a voltage of 10 V. The voltage on the control panel headphones can be adjusted by the ОПЕРАТОР (ОПЕРАТОР) control (R-303).

Assembly II of switch П-802 in STATION position connects the 1.7 V output of the receiver to БЗМ-2 telephone inserts and to the remote communication amplifier input (when connection is made at the switchboard). The voltage on the

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remote communication amplifier input can be adjusted with the aid of the remote communication (ВПС) regulator (resistor R-304).

3. Preparation of Radio Station for Transmission

(a) A.C. A l t e r n a t e

Preparation of the station for transmission in the A.C. alternate consists in delivering full filament voltage to the transmitter valves.

Connection is effected by turning switch П-301 from the FREQUENCY WATCHING to the TWO-WAY COMMUNICATION (ДВУСТОРОННЯЯ СВЯЗЬ) position, thus forming the following circuit: +26 V from stand-by rectifier through the above-mentioned circuit, switch П-304 (ON position), switch П-301 (assembly I, TWO-WAY COMMUNICATION position), connectors Ф-303-9 , Ф-103-9 , Ф-102-9 , Ф-401-9 , relay P-402 winding, connector Ф-403-4, , jumper in connector Ф-408 cap, connector Ф-403-1 , chassis.

By operating in the above circuit, relay P-402 with one spring assembly connects the transmitter filament circuit to the entire filament winding of transformer Тр-401; the valves receive full heating. With another spring assembly relay P-402 delivers: +26 V to contact 7 of connector Ф-401 which is used for changing the radio

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station over from reception to transmission from the metering unit when tuning the radio station.

When switch П-301 is set to TWO-WAY COMMUNICATION the circuit of relay Р-401 breaks, but as soon as the relay Р-402 operates, a new circuit is formed through the contact of the latter for relay Р-401, and the relay operates again after a momentary dropout.

Assembly II of switch П-301 in TWO-WAY COMMUNICATION position closes the circuit of signalling lamp Л-303 (TWO-WAY COMMUNICATION) at the control panel, the circuit of signalling lamp 137 FILAMENT (НАКАЛ) at the remote communication post and the circuit of the FILAMENT lamp at the ship's switchboard.

The same group of switch П-301 prepares the transmit-receive circuit of the radio station.

(b) D.C. A l t e r n a t e

In this alternate, in addition to switching on full heating of the transmitter, preparation of the radio station for two-way communication also consists in starting a powerful АМТ-3 converter instead of the low-powered ОП-120 converter.

Similar to the A.C. alternate, the radio station is prepared for two-way communication by setting switch П-301 in the TWO-WAY COMMUNICATION position.

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Assembly I of switch П-301 closes the starting relay circuit of converter АМГ-8 and the circuit of relay Р-402 controlling the transmitter filament:

-220 (110) V of the ship's mains through the above circuit, switch П-304 (ON position), switch П-301 (assembly I, TWO-WAY COMMUNICATION), (connectors Ф-303-9 , Ф-103-9, Ф-102-9) and then through two parallel circuits: first circuit - winding of relay Р-402 , connector Ф-403-4 , terminal "Е" of splice box No.2, terminal "Е" of the starting relay unit, resistor R-801 and to +220 (110) V of the ship's mains. Second circuit - connector Ф-403-3 , terminal "И" of splice box No.2, terminal "И" of starting relay unit, relay Р-801 winding and to +220 (110) V of the ship's mains.

Upon operating, relay Р-402 applies full voltage to the transmitter valve filaments and relay Р-801 switches on the motor of converter АМГ-8 and feeds A.C. voltage from generator АМГ-8 to transformer Тр-401 of the rectifier unit.

In this case too, relay Р-401 remains energized.

In case of changing over to TWO-WAY COMMUNICATION relay Р-802 drops out.

As may be seen from the diagram, both power supply alternates permit direct connection of the radio station for TWO-WAY COMMUNICATION; for this purpose switch П-301 should be set in the TWO-WAY COMMUNICATION position and switch П-804 turned to ON.

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4. Two-Way Radiotelephone Communication from Control Panel

Two-way radiotelephone communication through the radio station can be maintained both from the control panel and from the remote communication post.

The station should be first prepared as described in Paras 1, 2, 3.

When transmitting through microphone MPY from the control panel it is sufficient to press the microphone press-to-talk switch in order to apply power to the microphone and to change the station over to transmission. In this case lamp Л-301 TRANSMISSION (ПЕРЕДАЧА) is lighted on the control panel. The microphone is supplied through the following circuit: +26 V from connector Ф-303-2, supply filter choke Др-301 , switch П-302 (assembly VII, STATION position), resistor R-302, primary winding of transformer Тр-301 , plug Ф-305-3 , microphone, press-to-talk contact, connector Ф-305-4 , chassis (-26 V).

The audio-frequency voltage is fed from the secondary winding (3-6) of transformer Тр-301 to the input of the transmitter modulated amplifier through the circuit:

secondary winding of transformer Тр-801 ,

switch П-302 (assembly I, STATION position), connectors Ф-302-7, Ф-102-7 to the modulated amplifier input.

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The other end of the transformer Tp-301 secondary winding is earthed via switch П-302 (assembly III, STATION position).

At the same time another contact of the microphone press-to-talk switch changes the radio station over from reception to transmission; the following circuit is formed:

+26 V from connector Ф-303-2 , switch П-301 (assembly II, TWO-WAY COMMUNICATION position), connector Ф-305-5 , press-to-talk contact, connector Ф-305-6 , switch П-302 (assembly V, STATION position), connectors Ф-303-8 , Ф-103-8 , winding of relay P-101 , chassis.

In addition to this, from connector Ф-103-8 the circuit branches off via connectors Ф-102-8 , Ф-401-8 and Ф-402-8 to relay P-201 in the receiver and to relays P-403 and P-404 in the rectifier unit.

When operating, the contacts of relay P-101 switch the aerial over from the receiver input to the transmitter output.

With its auxiliary contacts this relay couples the grid voltage divider to the chassis, and as a result large negative voltages are taken from the transmitter valve grids to cut off the valves; they are brought to normal and the transmitter becomes operative.

Upon operating, relay P-201 in the receiver takes screen voltage from 1st converter and automatic control

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voltage from H.F. amplifier and also changes the operating conditions of the low-frequency pre-amplifier. Thus, the gain of the entire receiver channel diminishes.

With one of its contacts relay P-403 switches over turns 24-21 of transformer Tp-401 and with another contact disconnects the shunt from resistor R-401.

Thus, the transmitter receives the anode voltage necessary for operation, while the anode voltage of the receiver remains unchanged due to the resistor cut in.

Relay P-404 cuts in resistor R-402 in parallel with resistor R-404, thus providing a stable bias voltage in passing over to transmission while the radio station consumption from rectifier B-402 sharply increases.

3. Two-Way Radiotelephone Communication from the Remote Communication Post

Two-way radiotelephone communication from the remote communication post can be effected only after due preparation on the control panel (See Paras 1, 2, 3).

When the handset is picked up, the H.V. (ВЧСОКОЕ) signalling lamp lights up at the remote communication post, and the transmission circuits are prepared.

The H.V. signalling lamp is supplied through the following circuit:

+26 V from control-panel connector Ф-301-2 , splice box terminal "B" , switchboard terminal "B" , terminal "B" at

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the remote communication post, contact of lever 41, switch 138 in STATION position, terminal "Д" at the remote communication post terminal "Д" at the switchboard terminal, splice box terminals "Д" and "Б" , switchboard terminal "Б" , terminal "Б" at the remote communication post, lamp 136 (H.V.), terminal "A" at the remote communication post, switchboard terminal "A", splice box terminal "A" , chassis.

When the handset press-to-talk switch is pressed, relay P-30-1 in the radio station control panel P-609 operates closing with contacts (1-3) the microphone supply circuit and switching the radio station from reception to transmission with contact (4-6).

The handset supply circuit of the remote communication post is the following:

+26 V from connector Ф-303-2 , supply filter choke Др-301, switch П-302 (assembly VII, STATION position), resistor R-302, primary winding of tramsformer Тр-301 , contacts (1-3) of relay Р-301 , switch П-302 (assembly IV, STATION position), connector Ф-301-7 , terminal box terminal "Ж" , switchboard terminal "Ж", terminal "Ж" at the remote communication post switch 138 in STATION position, contact of lever 141, microphone, chassis.

Through contacts (4-6) relay Р-301 closes the circuit of relays Р-101 , Р-201 , Р-403 and Р-404 which is similarly to the circuit described above (See Para.4).

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In addition, relay P-301 contacts (10-11) connect R-306 to the monitoring circuit, thus reducing the reception reducing at the headphones and the loudspeaker of the remote communication post.

6. Radio Operator Calling Up Switchboard and Remote Communication Post

To call up the switchboard it is necessary to press button K-301 CALL (ВЫЗОВ) on the control panel; as a result, the following circuit is formed:

+24 V from the switchboard, switchboard terminal "И", splice box terminal "И", plug Ф-301-3, button K-301 contact, connector Ф-301-5 , splice box terminal "Н", switchboard terminal РВ , calling lamp, РВ (calling relay) winding, chassis (-24 V).

The calling lamp lights up at the switchboard. The switchboard operator calls up the remote communication post by setting the key to CALL.

If no switchboard is available, that is if the remote communication is directly connected to the radio station, it is necessary to set jumper "I"-"II" in splice box No.1 and to cross conductors "Н" and "С" . In this case, when button K-301 CALL is pressed, the following circuit is formed:

+26 V from connector Ф-303-2 , choke Др-301 , connector Ф-301-4 , jumper "I"-"II" in the splice box, ter-

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minal "И" , connector Ф-301-3 , button К-301 contact, connector Ф-301-5 , terminal box, terminal "С" , terminal "С" of remote communication post, lamp 114 СМ., chassis.

7. Telephone Intercommunication

In order to establish intercommunication switch П-302 on the control panel should be set in the ВНЮТЕ (ВПС) position.

Switch П-302 spring assembly V breaks the transmission relay control circuits: the station remains connected for reception.

Switch spring assemblies II, III and VI connect the secondary winding of transformer Тр-301 to the input of the remote communication post amplifier, while switch assembly VIII connects to the same circuit headphones ТА-4 of the radio station control panel.

Assembly VII of switch П-302 connects the microphone power supply to +24 V from the ship's switchboard.

If no switchboard is available jumper "I"-"II" is set in splice box No.1 and in case of intercommunication the microphones are fed from the radio station: +26 V is delivered in this case via control-panel choke Др-301.

At the remote communication post switch 138 should be set in the INTERCOMMUNICATION (ВН. ПЕРЕГОВОРЫ) position.

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The key diagram of telephone intercommunication, with or without a ship's switchboard, is given in Figs 8 and 9.

While telephone intercommunication is carried on, it is possible to watch the ether.

When switch П-303 (REMOTE) is in the ETHER WATCHING (КОНТР.ЭФИРА) position, it is possible to carry on telephone communication while listening to the radio message picked up by the receiver at reduced volume. The reception volume is reduced by inserting additional resistor R-305 in the telephone circuit.

In case of interference from the radio station, the receiver can be switched off for the period of intercommunication. When setting switch П-303 in RECEIVER OFF (ОТК. ПРИЕМН.) position, the earth is cut off from the grid bias divider R-248, R-249 and R-253 and, owing to this, the receiver valves are stopped.

8. Calling the Control-Panel Operator

The control-panel operator is called up by setting the switchboard key to CALL position; in this case control-panel lamp Л-302 (CALL) lights up.

If no switchboard is available, the call is made by pressing button 143 (CALL) at the remote communication post. In this case radio station control-panel lamp Л-302 also burns.

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which are controlled through separate circuits from the same buttons of the panel.

When the station is switched on to this or that channel, the button of the given channel closes at once two starting circuits.

When rotating, the receiver and transmitter selector motors find the circuit of the channel selected and are cut off automatically.

At the same time the transmitter and receiver are returned with the aid of selector bar mechanisms.

The selector motor starting circuits are separated because it is necessary to exclude by-pass circuits, which, due to the difference in the rotation time of the selector motors, prevent both motors from stopping against the selected channel.

Buttons K-101 and K-201 serve for resetting the selector bars when the station is tuned.

Resistors R-127 and R-262 connected in parallel with condensers C-170 and C-286 respectively form quench circuits to quench the sparks when the contacts of the selector motor interrupter are opened.

Thus, the channel selection system provides a convenient and rapid returning of the station to one of the four pre-set communication channels.

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III-4. Description of Rectifier Unit Key Diagram

1. Power Supply from the Ship's 110, 127 and 220 V A.C. Mains

127 V A.C. is fed via contacts 1-2 of connector Ф-404, switch П-401, fuses Пр-401 and Пр-403 to transformer Тр-402 of "stand-by" rectifier В-404.

In case of 110 or 220 V supply the supply voltage is likewise delivered via contacts 3-2 of connector Ф-404, switch П-401, fuses Пр-402 and Пр-403 to transformer Тр-402.

Switching over of the transformer Тр-402 for the appropriate supply voltage is effected with the aid of jumpers on the transformer, as shown in the diagram.

+26 V is fed from "stand-by" rectifier В-404 via contacts 3-4 of strip К-401 to the 10th contact of connector Ф-401 and to the 2nd contact of connector Ф-402 and then is taken to the control-panel starting units.

When the station is switched on from the control panel, +26 V is routed via the 9th contact of connector Ф-402, 5th contact of connector Ф-403, via cap jumper, 2nd contact of connector Ф-403, contacts 2-1 of strip К-401 to starting relay Р-401. Relay Р-401 operates and closes with its contacts the circuit of the transformer Тр-401 primary winding.

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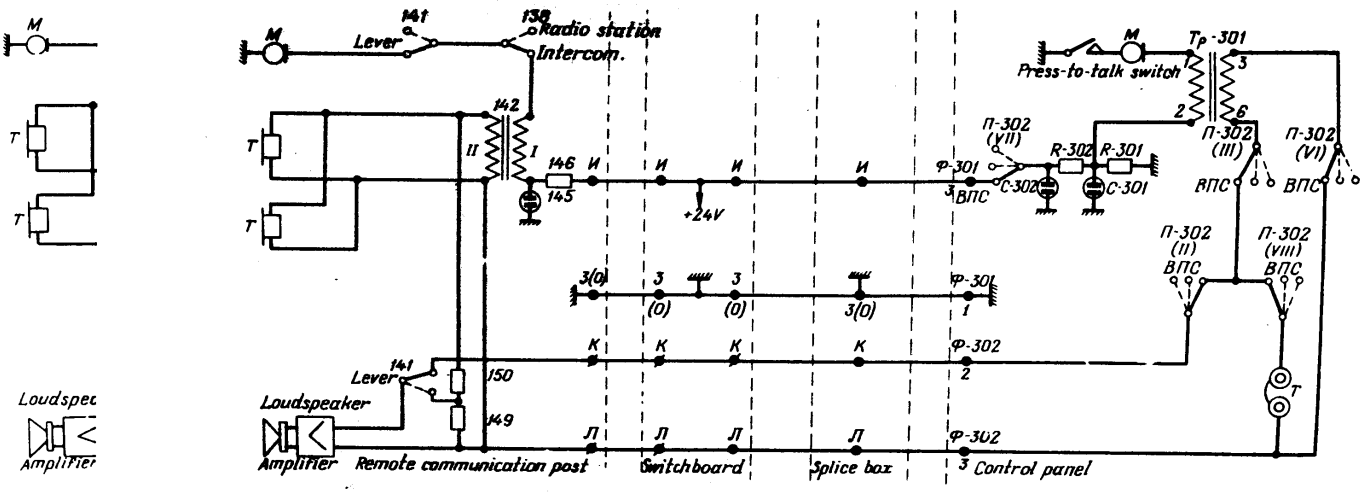

Fig.8. Diagram of Telephone Intercommunication through Switchboard

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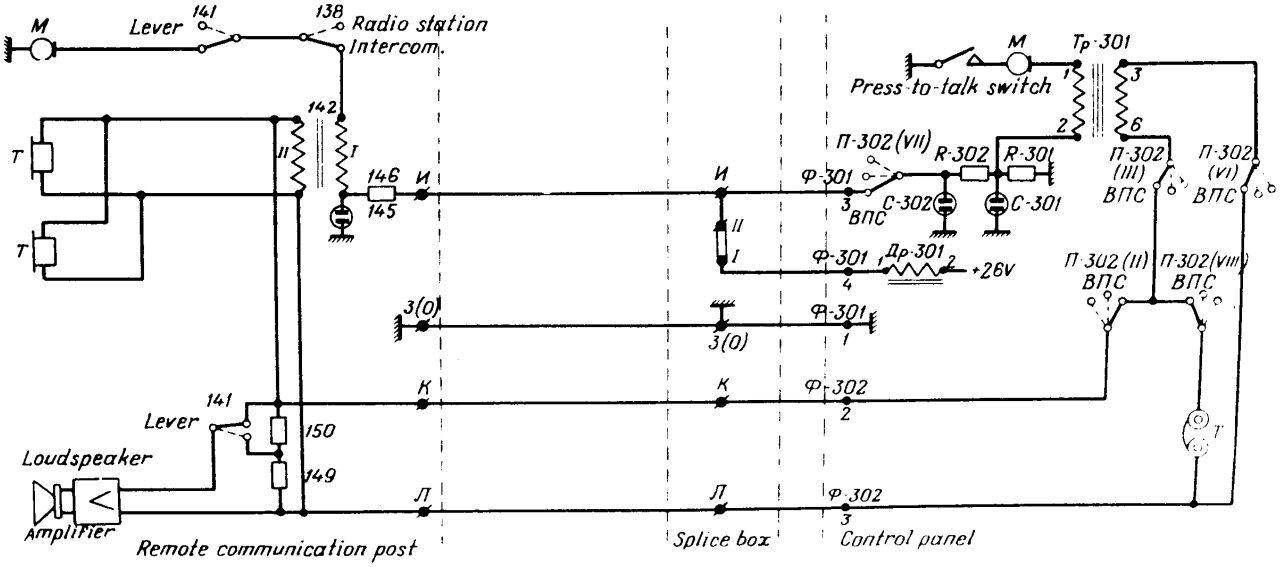

Fig.9. Diagram of Telephone Intercommunication without Switchboard

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From the three secondary windings of transformer Tp-401 the A.C. voltage is applied to rectifiers B-401 , B-402 and B-403 . The fourth secondary winding (contacts 9-12) is designed to feed alternating current to the transmitter and receiver valve filaments.

+26 V (rectified) is fed from rectifier B-401 to contacts 2 and 6 of connector Ф-401 , contact 31 of relay P-402 and contact 6 of connector Ф-402 for feeding the transmitter and receiver automatic control circuits as well as for feeding the microphone and signalling circuits in the control panel.

The transformer secondary winding feeding rectifier B-402 is switched over by the contacts of relay P-403 depending on the operation of the radio station: reception or transmission.

In case of reception +180 V is taken from rectifier B-402 via filter choke Др-401 and contacts 11-12 of relay P-403 to the 4th contact of connector Ф-402 to supply the anode and screen circuits of the receiver.

The negative terminal of rectifier B-402 is connected via parallel resistors R-404 and R-405 to the chassis.

The voltage drop in resistors R-404 and R-405 is used as the bias voltage for the receiver and delivered to the 3rd contact of connector Ф-402 and then to the grid voltage dividers in the receiver.

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In case of transmission relays P-403 and P-404 operate. Relay P-403 throws over contact 22 to contact 23, that is connects to the rectifier a greater number of turns of the transformer winding, thus stepping up the rectified voltage.

+315 V is fed via anode voltage filter choke Др-401 to the 4th contact of connector Ф-401 to supply the anode and screen circuits of the transmitter. Due to resistor R-401 cut in by contacts 11-12 of relay P-403 , the anode voltage for the receiver remains equal to 180 V.

Connection of resistor R-402 in parallel with resistors R-404 and R-405 provides constant grid bias for the receiver while the high voltage consumed by the station during transmission is increased.

The voltage ripple in the anode circuits is smoothed out by a filter consisting of choke Др-401 and condensers C-401 and C-402 .

Condensers C-404 and C-405 provide further filtering and decoupling of the receiver power supply circuits.

-105 V is supplied from rectifier B-403 via resistor R-403, 3rd contact of connector Ф-401 to the transmitter valve grids. Stabilovolt Д-401 keeps transmitter grid voltage constant.

Condenser C-403 serves as a filter in the bias circuit.

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In case of frequency watching relay P-402 is de-energized; therefore, the transmitter filament circuits are coupled to a half of the transformer Tp-401 filament winding and contacts 1 and 5 of plug Ф-401 receive reduced filament heating voltage. When the radio station is switched over to two-way communication, relay P-402 operates in the circuit described previously (See Section III-3), and full heating voltage is delivered via contacts 11-12 to contacts 1-5 of connector Ф-401 .

The transmitter valves, as those of the receiver, are combined into separate filament groups.

2. Power Supply from the Ship's D.C. Mains

In the D.C. supply alternate the jumpers on rectifier unit strip K-401 are set as shown in the diagram, that is terminals 1-3 and 2-4 are connected in pairs.

In this case the ship's mains minus is applied via connectors Ф-401-10 and Ф-402-2 to the control panel.

After the station is switched on, depending on the mode of operation selected (FREQUENCY WATCHING or TWO-WAY COMMUNICATION) a circuit is formed comprising either the starting relay of converter ОП-120 (relay P-802) or the starting relay of converter АМГ-3 (relay P-801).

Relay P-802 switches the converter on and passes 127 V A.C. to connectors Ф-404-1 and Ф-404-2 .

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Relay P-802 applies 110 V A.C. to the rectifier unit (to connector Φ-404-2 and Φ-404-3).

In both cases the voltage rectified by the "stand-by" rectifier causes relay P-401 to operate and switch on the main transformer Tp-401 of the unit.

Relay P-402 operates simultaneously with relay P-801, with which it is connected in parallel.

Resistor R-201 in the starting relay unit connected in parallel with relay P-402 is a damping resistor.

Its value is different depending on the D.C. mains voltage.

Since it is situated in the starting relay unit, it is replaced simultaneously with the unit itself (starting relay units are manufactured for one voltage only: either 110 or 220 V).

Otherwise the operation of the rectifier unit does not differ from the A.C. supply alternate considered above.

III-5. Description of Metering Unit Diagram

With the aid of a switch the metering unit allows a number of measurements to be taken and the transmitter and receiver [illegible] to be tuned with test connectors Φ-101 , Φ-204 [illegible] to the transmitter (Φ-101) or to the receiver

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In TRANSMITTER FILAMENT (НАКАЛ. ПЕР-КА) position the transmitter filament voltage is checked directly by the 50 V scale.

R-609 and R-610 are instrument multipliers.

In TRANSMITTER ANODE (АНОД ПЕР-КА) position the transmitter high voltage is checked. The instrument readings on the 50 V scale are multiplied by factor 10. R-601 and R-602 are instrument multipliers.

In TRANSMITTER BIAS (СМЕЩ. ПЕР-КА) position the negative bias voltage is checked. In this case the instrument readings are multiplied by factor 5. R-605 and R-606 are instrument multipliers.

In TRIPLER (УТРОИТЕЛЬ) position two circuits of the transmitter are tuned to resonate by the maximum deflection of the instrument pointer. In this case the instrument reads the 2nd frequency tripler anode current. The instrument readings on the 10 mA scale should be multiplied by factor 10.

In TRANSMITTER OUTPUT (ВЫХ. ПЕР.) position the second tripler anode circuit is tuned to resonate by the maximum deflection of the instrument pointer. In this case the device reads the total anode current of the power amplifier and that of the screen grids of the power amplifier and 2nd frequency tripler. The device readings on the 10 mA scale are multiplied by factor 15.

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In ANTENNA (АНТЕННА) position the power amplifier anode circuit is tuned by the maximum deflection of the instrument pointer, and the optimum coupling of the output circuit with the aerial is selected. The instrument readings on the 10 mA scale are multiplied by factor 0.1.

It should be borne in mind that the instrument readings are given in conventional units and represent not the current in the aerial, but the current in the indicator diode circuit.

In RECEIVER QUARTZ (КВАРЦ ПР-КА) position the receiver oscillator is tuned in the 3rd crystal harmonic by the maximum deflection of the instrument pointer. In this position the current in the multiplier anode circuit is checked.

In COMMON CURRENT (ОБЩИЙ ТОК) position the H.V. current consumed by the transmitter and receiver is measured. The instrument readings on the 10 mA scale should be multiplied by the appropriate factor: 30- for the transmitter and 10- for the receiver.

In RECEIVER FILAMENT (НАКАЛ ПР-КА) position the receiver filament voltage is checked directly on the 50 V scale.

In RECEIVER ANODE (АНОД ПР-КА) position the receiver anode voltage is checked. The instrument readings on the 50 V scale are multiplied by factor 6. R-614 and R-615 are range multipliers.

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In RECEIVER BIAS (СМЕЩ. ПР-КА) position the negative bias voltage is checked. In this case the instrument readings are multiplied by factor 0.5.

R-611 and R-612 are range multipliers.

In TESTER (ПРОВЕРИТЬ) position the device can be used as a tester for locating faults in the wiring, conductor and cable breaks, etc. In this case the tester prods should contact terminals TESTER and COMMON (ОБЩАЯ).

Resistor R-607 limits the current and resistor R-608 serves as a shunt to the instrument when it is used as a tester.

For current measurement the instrument is connected in parallel with the resistors which are cut into the circuits being measured; these resistors are located in the transmitter and the receiver and during measurements serve of shunts to the meter.

The terminals +ANODE and +FILAMENT (НАКАЛ) on the unit front panel make it possible to use the metering unit as a voltmeter of:

direct current with 500 V scale - in the TRANSMITTER ANODE position;

direct current with 300 V scale - in RECEIVER ANODE position;

direct current with 50 V scale - in FILAMENT positions (the jumper in "K" position);

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alternating current with 50 V scale - in FILAMENT positions (the jumper in "A" position).

When these measurements are taken connector Ø-101-204 should by all means be disconnected from the receiver and transmitter. The voltage measured is applied to the common terminal and to the +ANODE terminal (for the former two cases) and to the +FILAMENT terminal (for the latter two cases).

The metering unit has a push-button mechanism which allows the radio station channels to be selected without using the control panel.

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Section II

OPERATING INSTRUCTIONS

I. PREPARATION FOR USE

Before switching the radio station on:

1. Connect all the radio station units with cables, tighten all connectors in the panels and by inspection make sure that there are no cable fractures or damaged shieldings.

2. See if the radio station units, junction cables and the aerial feeder are securely fastened;

3. See if the junctions between the individual unit chassis and the ship's hull (or an earthing bar) are reliable;

4. After assembling the station or after repairs set jumpers (as shown in the diagram or according to the instructions on the equipment):

(a) in the rectifier unit - jumpers on both power transformers and on the front panel, depending on the voltage and the supply alternate;

(b) in the metering unit - jumper in the "A" position;

(c) on splice box No.1 - depending on whether or not there is a switchboard and on whether or not it is necessary to cut in an additional loudspeaker.

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5. If only one converter is used to supply the radio station, the FREQUENCY WATCHING - TWO-WAY COMMUNICATION switch should be always set to TWO-WAY COMMUNICATION.

6. The ship's mains is connected to converter ОП-120 in the following way; the mains plus is connected to the terminal marked +, and the mains minus, to the third terminal marked 90 W.

II. CONNECTING THE STATION TO POWER SUPPLY

Power is applied to the radio station by setting the switch on the rectifier unit in the ON (ВКЛЮЧЕНО) position. In the D.C. alternate, in addition to this, the switch on the starting relay unit should be thrown from OFF (ВЫКЛ.) to one of the extreme positions STARBOARD MAINS or PORT MAINS (ЛЕВАЯ Б.С. or ПРАВАЯ Б.С.).

These operations are preparatory, final connection of the radio station is effected by remote control from the radio station control panel.

III. RADIO STATION CONTROL FROM CONTROL PANEL

The radio station is switched on from the control panel by setting the station switch in the ON position.

The FREQUENCY WATCHING - TWO-WAY COMMUNICATION switch is used to select the desired mode of operation.

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When switching the radio station on for prolonged reception the FREQUENCY WATCHING operation should be selected; changing to TWO-WAY COMMUNICATION should be effected only if radio communication with other parties is necessary.

Switching the radio station on for two-way communication is indicated by the TWO-WAY COMMUNICATION green lamp lighting up on the control panel.

III-1. Frequency Watching

To maintain frequency watching:

(a) set selector switch REMOTE STATION - EXTERNAL MODULATION (ВПС - РАЦИЯ-ВНЕШНЯЯ МОДУЛЯЦИЯ) in the STATION position;

(b) select the frequency watching operation; for this purpose set the switch FREQUENCY WATCHING - TWO-WAY COMMUNICATION in the FREQUENCY WATCHING position;

(c) by pressing one of the buttons 1, 2, 3 or 4 select one of the four pre-set channels;

(d) with OPERATOR (ОПЕРАТОР) volume control set the required reception volume in the control panel headphones ТА-4 ;

(e) with REMOTE volume control set the necessary reception volume in the БЗМ-2 headphones and in the remote communication post loudspeaker.

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III-2. Two-Way Communication

In order to carry on two-way communication:

(a) set selector switch REMOTE-STATION - EXTERNAL MODULATION in the STATION position;

(b) select the two-way communication operation. For this purpose turn the FREQUENCY WATCHING - TWO-WAY COMMUNICATION switch to TWO-WAY COMMUNICATION as a result the TWO-WAY COMMUNICATION signalling lamp (green) lights up;

(c) pick the desired channel out of the four pre-set channels; for this purpose press one of the buttons 1, 2, 3 or 4 on the control panel;

(d) press the МРУ microphone press-to-talk switch when transmitting and release it when receiving. When the press-to-talk switch is pressed, the TRANSMISSION (ПЕРЕДАЧА) signalling lamp (red) is lighted;

(e) adjust the reception volume in the control panel ТА-4 headphones with the aid of OPERATOR control.

III-3. Calling and Intercommunication

The ship's switchboard or the remote communication post operator is called by pressing the CALL button on the control panel.

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A call from the remote communication post is indicated on the control panel by lighting of the white CALL signalling lamp.

For telephone intercommunication with the remote post operator:

(a) set the REMOTE STATION - EXTERNAL MODULATION selector switch in the REMOTE position;

(b) set the REMOTE switch on the control panel in the ETHER WATCHING (КОНТРОЛЬ ЭФИРА) position;

(c) when the МРУ microphone press-to-talk switch is pressed, normal telephone duplex communication is effected; reception is carried on through the control panel ТА-4 headphones;

(d) When the REMOTE switch is in the ETHER WATCHING position reception in the selected channel is simultaneously carried on at reduced volume.

If there is interference from the radio station the receiver can be disconnected as long as telephone communication is maintained; for this purpose the REMOTE switch should be set in the RECEIVER OFF position.

Note: If a ship's switchboard is available, telephone intercommunication and call-making are carried on both with the radio station switched on and off.

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If no switchboard is available, intercommunication and call-making are effected only with the radio station switched on.

IV. CONTROL FROM REMOTE COMMUNICATION POST (ВПС)

For operation from remote communication posts the radio station can be used only after being switched on from the control panel.

The mode of operation (FREQUENCY WATCHING or TWO-WAY COMMUNICATION) is selected on the control panel.

At the remote communication post the connection of the radio station for two-way communication is indicated by the FILAMENT and HIGH VOLTAGE (ВЫСОКОЕ НАПРЯЖЕНИЕ) lamps (the latter lamp goes on when the HIGH VOLTAGE switch is set in the ON position).

1. In frequency watching reception is carried on with the aid of БЭМ-2 headphones and the loudspeaker of the remote communication posts.

2. In two-way communication radio communication is effected with the TELEPHONE (ТЕЛЕФОН) switch in RADIO (РАДИО) position. Transmission is carried on with the handset press-to-talk switch pressed and reception, when it is released.

3. Telephone intercommunication with the control panel operator is carried on with the TELEPHONE switch at the

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remote communication post in the CONVERSATION (ПЕРЕГОВОР) position.

Calls are made by pressing the CALL button at the remote communication post.

V. TUNING THE RADIO STATION

V-1. General

Before tuning the radio station it is necessary to open the casings covering the selector bar mechanisms of the receiver and transmitter channel selection systems and to insert crystals corresponding to the assigned communication wave lengths in quartz sockets 1, 2, 3 and 4.

The quartz crystals for the transmitter are marked "A", and the quartz crystals for the receiver, "Б" .

Both crystals bear the station frequency in megacycles.

If the radio station units are mounted on the mounting frame, turn the metering unit through 90°. For this purpose release the detent by pressing the button on the metering unit frame; then open the metering unit cover. The general view of the radio station when being tuned is shown in Fig.10.

Before tuning reset the channel buttons by pressing the RESET (СБРОС) button on the control panel.

When turning the transmitter and the receiver, follow the rules set forth below.

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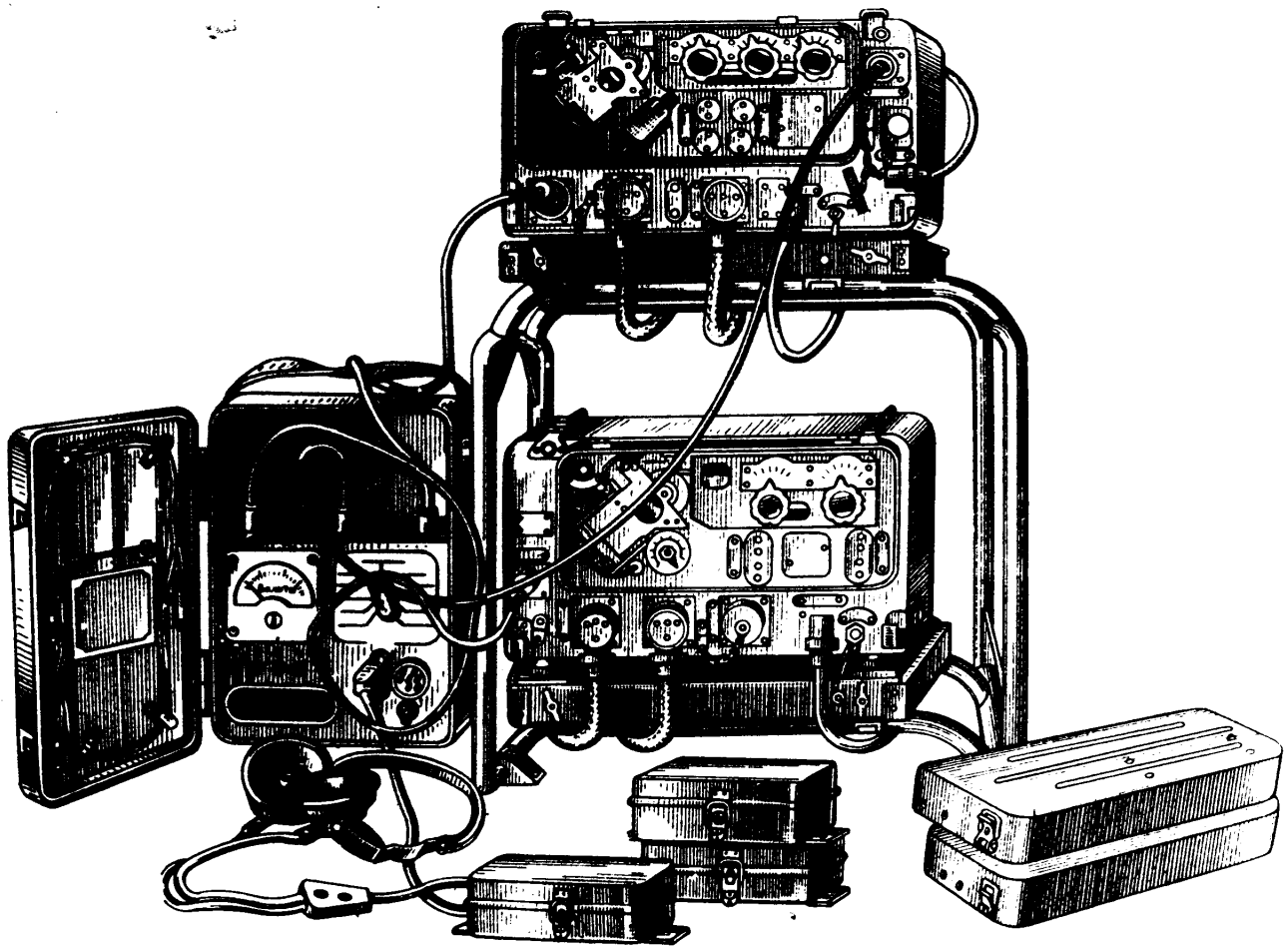

Fig. 10. Radio Station when Being Tuned

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8. Set the switch in the AERIAL (АНТЕННА) position and obtain with the third knob the maximum reading of the instrument.

Note: The quality of tuning is checked and adjustment of each transmitter knob is carried out with the metering unit controls in the appropriate positions, i.e. the first knob, in the TRIPLER position, the second knob, in the TRANSMITTER OUTPUT position, and the third knob, in the AERIAL position.

9. Press button 2 on the metering unit and tune the second channel in the same way as described in Paras 4, 6, 7, 8.

Channels 3 and 4 are tuned in the same manner.

10. After the transmitter is tuned to all the four channels, reset the mechanism selector bars by pressing the RESET button on the transmitter. Then, beginning with the left-hand knob, lock all the three tuning knobs in turn, by tightening their locknuts.

Caution:

(a) The channels should be tuned in the prescribed sequence.

Each time a new channel is selected, the channel selection mechanism will select channels in the order of 1, 2, 3, 4 until the necessary channel is selected.

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For example: if channel 2 has been selected and it is necessary to change to channel 1, the channels will be selected in the order of 3, 4 and 1. If channels 3 and 4 have been tuned before, then with the knobs unlocked the tuning will be upset.

(b) The tuning knobs should be locked only after resetting the selector bars of the channel selection mechanism. Otherwise the selector bar mechanism may be damaged.

11. After the tuning knobs have been locked, it is necessary to check up if the tuning is correct, i.e. to make sure that in the AERIAL position instrument readings in all the channels correspond to those obtained by fine tuning before the knobs were locked.

12. If the check prescribed in Para. 11 shows that the instrument readings have changed in some channel, this channel should be tuned. When tuning one of the channels of a tuned transmitter, first select the channel preceding the one being tuned, and then by pressing the RESET button on the transmitter, release the selector bars and unlock the tuning knobs. The required channel is then selected and tuned. After tuning, reset the selector bars, lock the knobs and check the instrument reading again.

13. Optimum coupling of the transmitter output circuit with the feeder and aerial is selected when the radio sta-

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tion is installed for the first time or after the aerial or feeder have been replaced, on the lowest of the range frequencies used, with the MAXIMUM-MINIMUM (МАКС.-МИН.) control.

For selecting optimum coupling, turn off the cap covering the aerial coupling screw, insert the screwdriver in the screw slit, turn the screw until maximum instrument readings are obtained in the AERIAL position.

After optimum coupling has been selected, it is necessary to tune the transmitter.

14. When the tuning of the transmitter is over, set the switch on the metering unit in the RECEPTION (ПРИЕМ) position and disconnect the test cables from the transmitter.

15. Put the casing on the channel and crystal selection mechanism. Screw on the cap covering the transmitter aerial coupling screw.

V-3. Tuning the Receiver

1. Connect the metering unit cables to the receiver (Ф-201 and Ф-204).

2. Press the RESET button on the receiver front panel, after which release two tuning knob locknuts, giving them one counter-clockwise turn.

3. In the RECEIVER FILAMENT, RECEIVER ANODE, RECEIVER BIAS positions check if the respective voltages are available.

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4. Set the SENSITIVITY (ЧУВСТВИТЕЛЬНОСТЬ) control pointer in the 10 position.

5. Press button 1 on the metering unit and, using the receiver scale graduation, set the knobs approximately to the wave length being tuned in.

6. Set the switch on the metering unit in the QUARTZ (КВАРЦ) position and, by turning the left-hand tuning knob about the position selected on the scale, attain the maximum reading of the instrument.

7. By turning the right-hand tuning knob, obtain a position in which noise in the headphones connected to the metering unit are maximum. Adjust the receiver left-hand knob by the maximum noise in the headphones.

8. Press button "2" on the metering unit and tune the second receiver channel by using the procedure indicated in Paras 5, 6 and 7. The other two channels are tuned in the same way.

9. After tuning, by pressing the RESET button, reset the selector bars of the channel selection mechanism and lock the tuning knobs by turning the locknuts clockwise as far as they will go.

Note: The precautions outlined in Para.10 concerning the transmitter fully apply to the receiver.

10. After the knobs have been locked switch over channels 1, 2, 3 and 4 to see if there is noise in the

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headphones and if its level is the same as was obtained before the knobs were locked.

If there is no noise or its level is lower in any of the channels, this channel should be tuned. The channel is tuned in the same way as a transmitter channel (See Para.12, "Tuning the Transmitter").

11. Disconnect the test cables from the receiver, put the casing on the channel and crystal selection mechanism.

12. Coil the metering unit cables and place them into the metering unit compartment specially assigned for them.

13. Close the metering unit cover. If the metering unit is mounted on a mounting frame, turn the unit through 90° on the hinge and lock it in the inoperative position.

When tuning the radio station follow the above instructions, tuning the receiver and transmitter by the maximum deflection of the instrument. During permissible mains voltage fluctuations instrument readings should be within the values given in Table V-1.

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Table V-1

Nos	Switch positions	Instrument readings	
		Transmitter	Receiver
1	Filament	from 20.5 to 28 V	from 20.5 to 28 V
2	Anode	from 280 to 350 V	from 150 to 210 V
3	Bias	from 95 to 115 V	from 8 to 11.5 mA
4	Common current . .	from 180 to 295 mA	from 50 to 80 mA
5	Tripler	from 35 to 70 mA	-
6	Transmitter output	maximum deflection	-
7	Receiver quartz . .	-	maximum deflection
8	Aerial	maximum deflection	-

V-4. Checking the Station

1. After the receiver and transmitter have been tuned, set the RECEIVE-TRANSMIT (ПРИЕМ-ПЕРЕДАЧА) switch in the TRANSMIT position and, while transmitting, make sure that the operation is trouble-free by monitoring your own transmission.

2. Make sure that the operation of the channel selection mechanism is trouble-free; for this purpose switch on all the four channels in succession and make a monitoring check in each channel.

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3. If possible, check the radio station operation by establishing communication with some other radio station.

4. Complete test and check of the radio station units should be carried out with the aid of a special portable instrument or in a repair shop furnished with appropriate equipment.

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